

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

Manufacturing Resources International, Inc.,

Plaintiff,

v.

Civiq Smartscares, LLC, *et al.*,

Defendants.

C.A. No. 17-269-RGA

**EXHIBITS BBBB-CCCC, EEEE-FFFF AND KKKK TO
BRIEF IN SUPPORT OF PLAINTIFF'S (MRI'S) RESPONSE TO DEFENDANTS'
MOTION FOR PARTIAL SUMMARY JUDGMENT AND TO EXCLUDE CERTAIN
EXPERT TESTIMONY**

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Dated: May 6, 2019

EXHIBIT BBBB

7685951

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July 11, 2018

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Certified by

Andres Ibarra

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PTO/AIA/82A (07-13)

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Application Number	
Filing Date	October 7, 2014
First Named Inventor	Dunn
Title	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate
Art Unit	
Examiner Name	
Attorney Docket Number	MAN2241-010J

SIGNATURE of Applicant or Patent Practitioner

Signature	/Tyler Dunham/	Date (Optional)	October 7, 2014
Name	Tyler Dunham	Registration Number	60364
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.



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This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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MRI00320698

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I hereby appoint the practitioners associated with the following Customer Number for Standley Law Group LLP:

08698

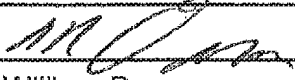
as my/our attorneys or agents, and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (for PTO/AIA/82A or equivalent).

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I am the Applicant:

- ☐ Inventor or Joint Inventor
- ☐ Legal Representative of a Deceased or Legally Incapacitated Inventor
- ☒ Assignee or Person to Whom the Inventor is Under an Obligation to Assign
- ☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document)

SIGNATURE of Applicant for Patent

Signature		Date	11/11/2012
Name	William Dunn		
Title	President		
Company	Manufacturing Resources International, Inc.		

Note: Signature - this form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms for more than one signature, see below*.

*Total of 1 forms are submitted.

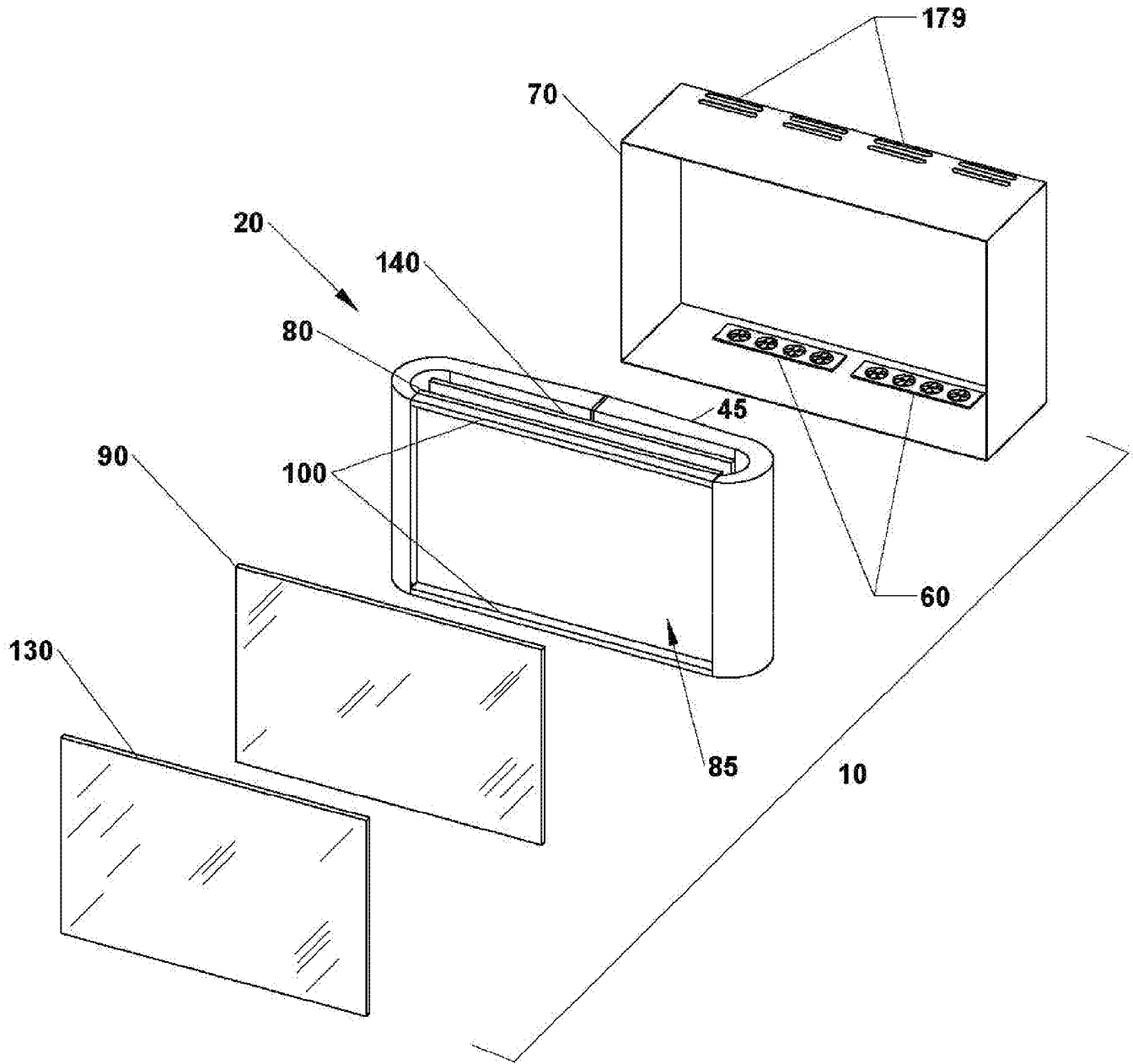


Fig. 1

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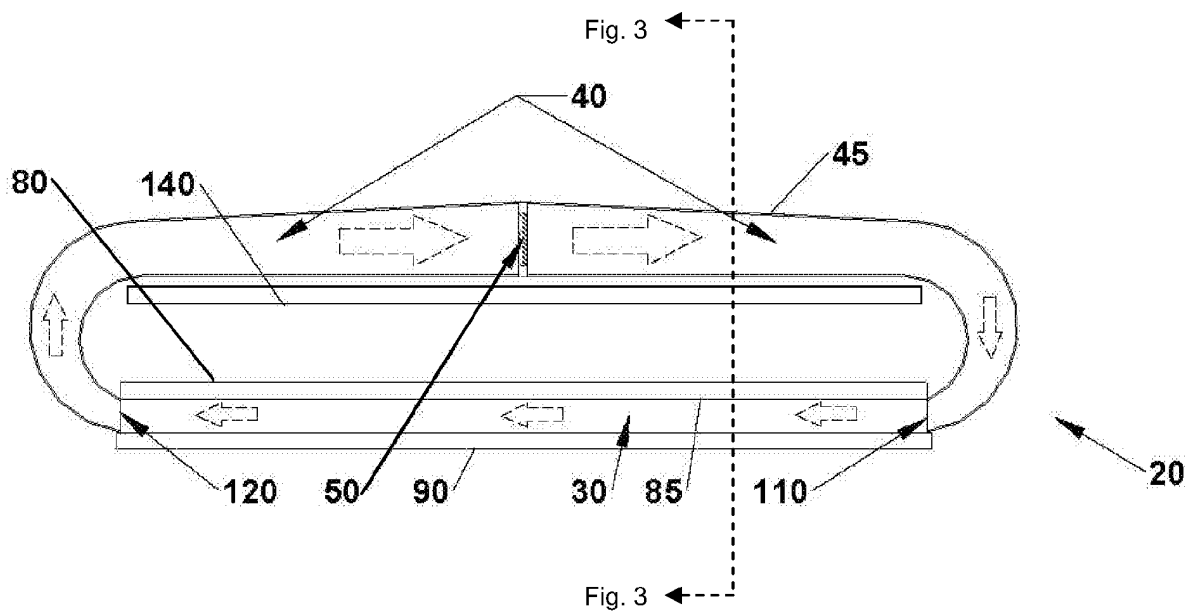


Fig. 2

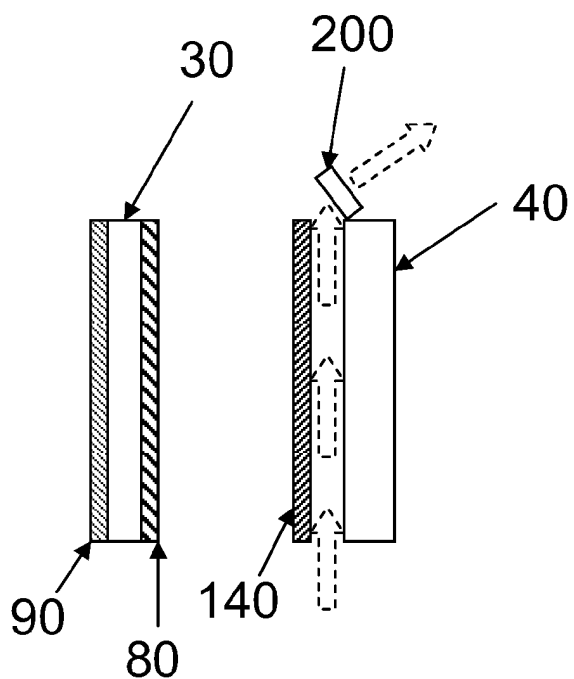


Fig. 3A

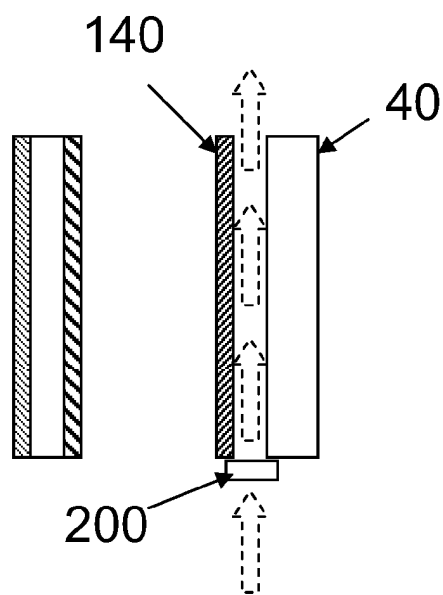


Fig. 3B

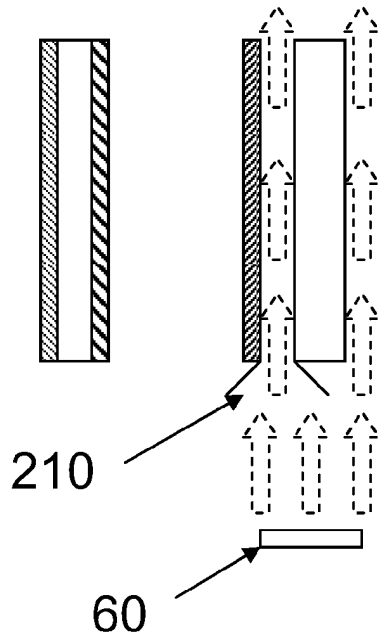


Fig. 3C

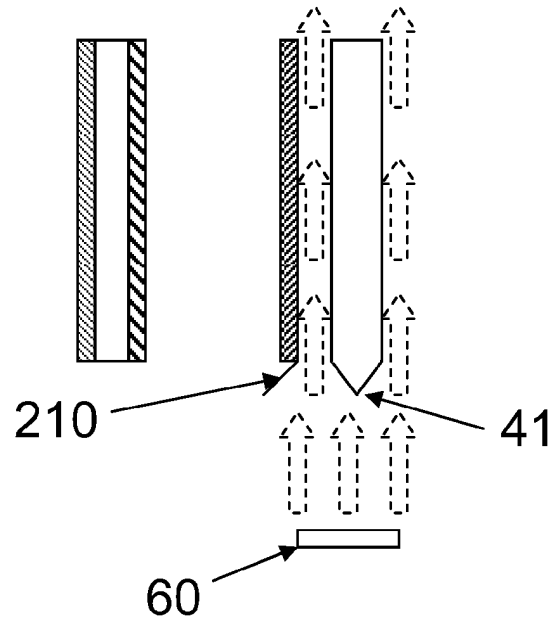


Fig. 3D

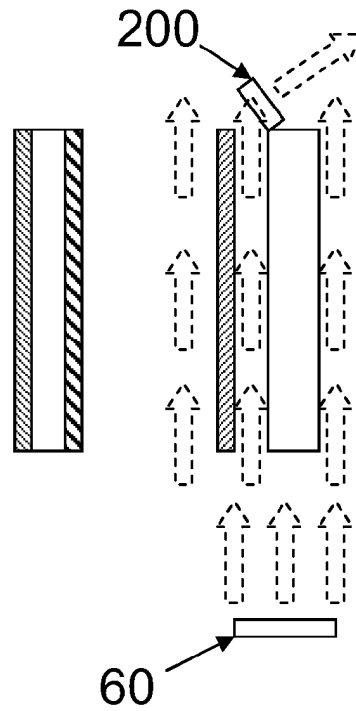


Fig. 3E

System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

Inventor: William Dunn

Cross-Reference to Related Applications

[0001] This application is a continuation of U.S. Application No. 14/803,848 filed on July 20, 2015, now U.S. Patent 9,370,127 issued June 14, 2016. U.S. Application No. 14/803,848 is a continuation of U.S. Application No. 14/508,767 filed on October 7, 2014, now U.S. Patent 9,089,079 issued July 21, 2015. U.S. Application No. 14/508,767 is a continuation of U.S. Application No. 13/937,777 filed on July 9, 2013, now U.S. Patent 8,854,572 issued October 7, 2014. U.S. Application No. 13/937,777 is a continuation of U.S. Application No. 13/605,530 filed on September 6, 2012, now U.S. Patent 8,482,695 issued July 9, 2013. U.S. Application No. 13/605,530 is a continuation of U.S. Application No. 12/620,330 filed on November 17, 2009, now U.S. Patent 8,274,622 issued September 25, 2012, which is a non-provisional application of U.S. Application No. 61/115,333 filed November 17, 2008. U.S. Application No. 12/620,330 is also continuation-in-part of U.S. Application No. 12/411,925 filed March 26, 2009, now U.S. Patent 8,854,595 issued October 7, 2014, which is a non-provisional application of U.S. Provisional Application No. 61/039,454 filed March 26, 2008. U.S. Application No. 12/620,330 is also a continuation-in-part of U.S. Application No. 12/556,029 filed September 9, 2009, now U.S. Patent 8,373,841 issued February 12, 2013, which is a non-provisional application of U.S. Provisional Application No. 61/095,615 filed September 9, 2008. U.S. Application No. 12/620,330 is also a continuation-in-part of U.S. Application No. 12/234,307 filed September 19, 2008, now U.S. Patent 8,767,165 issued

July 1, 2014, which is a non-provisional application of U.S. Provisional Application No. 61/033,064 filed March 3, 2008. U.S. Application No. 12/620,330 is also a continuation-in-part of U.S. Application No. 12/234,360 filed September 19, 2008, which is a non-provisional application of U.S. Provisional Application No. 61/053,713 filed May 16, 2008. U.S. Application No. 12/620,330 is also a continuation-in-part of U.S. Application No. 12/237,365, filed September 24, 2008, now U.S. Patent 8,879,042 issued November 4, 2014, which is a non-provisional application of U.S. Provisional Application No. 61/057,599 filed May 30, 2008. U.S. Application No. 12/620,330 is also a continuation-in-part of U.S. Application No. 12/235,200 filed September 22, 2008, which is a non-provisional application of U.S. Provisional Application No. 61/076,126 filed June 26, 2008. All aforementioned applications are hereby incorporated by reference in their entirety as if fully cited herein.

Technical Field

[0002] Exemplary embodiments generally relate to cooling systems for electronic displays.

Background of the Art

[0003] Conductive and convective heat transfer systems for electronic displays are known. These systems of the past generally attempt to remove heat from the electronic components in a display through as many sidewalls of the display as possible. While such heat transfer systems have enjoyed a measure of success in the past, improvements to displays require even greater cooling capabilities.

[0004] In particular, cooling devices for electronic displays of the past have generally used convective heat dissipation systems that function to cool an entire interior of the display by one or more fans and fins, for example. By itself, this is not adequate in many climates, especially when radiative heat transfer from the sun through a display window becomes a major factor. In many applications and locations 200 Watts or more of power through such a display window is common. Additionally, modern applications call for larger displays than previous applications. For example, some outdoor applications call for forty-seven inch screens and above. With increased heat production from the larger screens and radiative heat transfer from the sun through the display window, more efficient and powerful heat dissipation systems are required.

Summary of the Exemplary Embodiments

[0005] A large fluctuation in temperature is common in the devices of the past. Such temperature fluctuation adversely affects the electronic components in these devices. Whereas the systems of the past attempted to remove heat only through the non-display sides and rear components of the enclosure surrounding the electronic display components, a preferred embodiment causes convective heat transfer from the face of the display as well. By the aspects described below, exemplary embodiments have made consistent cooling possible for electronic displays having screens of sizes greater than or equal to twelve inches. For example, cooling of a 55 inch screen can be achieved, even in extremely hot climates. Greater cooling capabilities are provided by the device and method described and shown in more detail below.

[0006] An exemplary embodiment relates to an isolated gas cooling system and a method for cooling an electronic display. An exemplary embodiment includes an isolated gas cooling chamber. The gas cooling chamber is preferably a closed loop which includes a first gas chamber comprising a transparent anterior plate and a second gas chamber comprising a cooling plenum.

[0007] The first gas chamber is anterior to and coextensive with the viewable face of the electronic display surface. The transparent anterior plate may be set forward of the electronic display surface by spacers defining the depth of the first gas chamber. A cooling chamber fan, or equivalent means, maybe located within the cooling plenum. The fan may be used to propel gas around the isolated gas cooling chamber loop. As the gas traverses the first gas chamber it contacts the electronic display surface, absorbing heat from the surface of the display. Because the gas and the relevant surfaces of the first gas chamber are transparent, the image quality would preferably remain excellent. After the gas has traversed the transparent first gas chamber, the gas may be directed into the rear cooling plenum.

[0008] In order to cool the gas in the plenum, external convective or conductive means may be employed. In at least one embodiment, an external fan unit may also be included within the housing of the display. The external fan unit may be positioned to provide a flow of ingested air over the external surfaces of the plenum. The heated air in the housing may exit the housing as exhaust.

[0009] The two chambers of the closed loop plenum encircle the electronic display. Within electronic displays is typically a backlight, especially in liquid crystal displays (LCD). The backlight can be a significant source of heat for the electronic display.

Exemplary embodiments position the backlight sufficiently close to the wall of the cooling plenum so that convective heat transfer from the backlight can be increased. The external fan may force air between the plenum and the backlight or air may be pulled from the top of the display using an additional fan unit. Alternatively, a combination of both fans may be employed.

[0010] The foregoing and other features and advantages of the present invention will be apparent from the following more detailed description of the particular embodiments of the invention, as illustrated in the accompanying drawings.

Brief Description of the Drawings

[0011] A better understanding of an exemplary embodiment will be obtained from a reading of the following detailed description and the accompanying drawings wherein identical reference characters refer to identical parts and in which:

[0012] FIGURE 1 is an exploded perspective view of an exemplary embodiment showing components of the isolated gas cooling system.

[0013] FIGURE 2 is top sectional view of an exemplary embodiment of the cooling chamber.

[0014] FIGURES 3A-3E are cross sectional views of exemplary embodiments using constricted convection cooling.

Detailed Description

[0015] FIGURE 1 is an exploded view of an exemplary embodiment of the closed loop cooling system. This system is fully described in co-pending U.S. application Nos. 61/033064 and 61/053713 herein incorporated by reference in their entirety.

[0016] It is to be understood that the disclosed embodiments includes the cooling of displays including, but not limited to LCDs. By way of example and not by way of limitation, the exemplary embodiments may be used in conjunction with displays selected from among LCD (including TFT or STN type), light emitting diode (LED), organic light emitting diode (OLED), field emitting display (FED), cathode ray tube (CRT), and plasma displays. Furthermore, embodiments may be used with displays of other types including those not yet discovered. In particular, it is contemplated that the exemplary embodiments may be well suited for use with full color, flat panel OLED displays. While the embodiments described herein are well suited for outdoor environments, they may also be appropriate for indoor applications (e.g., factory environments) where thermal stability of the display may be at risk.

[0017] An exemplary embodiment 10 of the electronic display and gas cooling system includes an isolated gas cooling chamber 20 contained within an electronic display housing 70. A narrow transparent first gas chamber may be defined by spacers 100 and transparent front plate 90. A second transparent front plate 130 may be laminated to front plate 90 to help prevent breakage of transparent plate 90. Cooling chamber 20 surrounds an electronic display 80 (in this case an LCD stack) and associated backlight panel 140 (although some embodiments may not require a backlight panel).

[0018] The gas cooling system 10 may include means for cooling gas contained within the cooling plenum 45. This means may include a fan 60 which may be positioned at the

base of the display housing 70. The fan will force the cooler ingested air over at least one external surface of a posterior cooling plenum 45. If desired, an air conditioner (not shown) may also be utilized to cool the air which contacts the external surface of plenum 45. This air may be the same air that is forced between the backlight 145 and the surface of the plenum 45 in order to further cool the backlight 145.

[0019] Referring to FIGURE 2, in at least one embodiment the isolated gas cooling chamber 20 comprises a closed loop which includes a first gas chamber 30 and a rear cooling chamber 40. The first gas chamber includes a transparent plate 90. The second gas chamber comprises a cooling plenum 45. The term “isolated gas” refers to the fact that the gas within the isolated gas cooling chamber 20 is essentially isolated from external air in the housing of the display. Because the first gas chamber 30 is positioned in front of the display image, the gas should be substantially free of dust or other contaminants that might negatively affect the display image.

[0020] The isolated gas may be almost any transparent gas, for example, normal air, nitrogen, helium, or any other transparent gas. The gas is preferably colorless so as not to affect the image quality. Furthermore, the isolated gas cooling chamber need not necessarily be hermetically sealed from the external air. It is sufficient that the gas in the chamber is isolated to the extent that dust and contaminants may not substantially enter the first gas chamber.

[0021] The first gas chamber 30 is in gaseous communication with the rear cooling chamber 40. A cooling chamber fan 50 may be provided within the posterior plenum 45. The cooling fan 50 may be utilized to propel gas around the isolated gas cooling chamber 20. The first gas chamber 30 includes at least one transparent plate 90

mounted in front of an electronic display surface 85. The transparent plate 90 may be set forward from the electronic display surface 85 by spacers 100. The spacing members 100 define the depth of the narrow channel passing in front of the electronic display surface 85. The spacing members 100 may be independent or alternatively may be integral with some other component of the device (e.g., integral with the front plate). The electronic display surface 85, the spacing members, and the transparent front plate 90 define a narrow first gas chamber 30. The chamber 30 is in gaseous communication with plenum 45 through entrance opening 110 and exit opening 120.

[0022] FIGURE 3A shows a cross-sectional view of the section that is shown in Figure 2. Towards the front of the display is the first gas chamber 30 which abuts against the electronic display 80. In front of the first gas chamber 30 is the transparent plate 90. Towards the rear of the display, the backlight 140 is placed in close proximity to the posterior rear cooling chamber 40. The close proximity of these two elements, in part, creates the constricted convection cooling of the backlight 140. One or more constricted convection fans 200 may be used to draw air between the backlight 140 and the rear cooling chamber 40. It has been found that forcing air through a smaller space increases the cooling abilities of the system. The distance between the backlight 140 and the rear cooling chamber 40 may vary depending on many factors, including but not limited to: the size of the display, the design of the backlight assembly, the desired operating environment, and the size and speed of the selected constricted convection fans. An ideal distance may be between 0.25 and 1.25 inches. Alternatively, an ideal distance may be between 0.33 and 2.5 inches. Larger distances may be preferable, depending at least upon the many factors listed above.

[0023] The backlight may comprise a printed circuit board (PCB) with a plurality of lights mounted to the side facing the electronic display 80. The lights in the backlight may be any one of the following: LED's, organic light emitting diodes (OLED), field emitting display (FED), light emitting polymer (LEP), or organic electro-luminescence (OEL) lights. In an exemplary embodiment, the backlight 140 would ideally have a low level of thermal resistance between the side facing the electronic display 80 and the side facing the cooling plenum. To accomplish this low level of thermal resistance, the backlight 140 may be built using metal printed circuit board (PCB) technology to further transfer heat away from the lights. The rear surface of the backlight 140 may also be metallic, or some other thermally conductive material, to further enhance the convective heat transferring properties. The surface may even have a plurality of surface features such as fins to further enhance the convective heat transferring properties. The constricted convection fan 200 may then send the warm air out of an exhaust 179 (shown in Figure 1) so that it may exit the display housing entirely.

[0024] FIGURE 3B shows another cross-sectional view of another embodiment for the constricted convection setup. In this embodiment, the constricted convection fan 200 is used to push air between the backlight 140 and the rear cooling chamber 40. FIGURE 3C shows an embodiment without the constricted convection fan, but instead uses the fan 60 which draws air from outside the display housing. As noted above, this air may simply be ambient air or alternatively this air may come from a conditioning unit (not shown). To facilitate the flow of air between the backlight 140 and the rear cooling chamber 40, a guiding device 210 may be used.

[0025] FIGURE 3D shows another embodiment, where the rear cooling chamber 40 contains a guiding feature 41, which is used in combination with the guiding device 210 to facilitate the flow of air between the backlight and the cooling chamber. FIGURE 3E shows another embodiment, where both the fan 60 and the constricted convection fan 200 is used. This embodiment could also utilize a version of the guiding devices shown in Figures 3C and 3D.

[0026] While the display is operational, the fan 60 and the constricted convection fan 200 may run continuously. However, if desired, a temperature sensor (not shown) and a switch or microcontroller (not shown) may be incorporated within the electronic display. This effective thermostat may be used to detect when temperatures have reached a predetermined threshold value. In such a case, the various fans may be selectively engaged when the temperature in the display reaches a predetermined value. Predetermined thresholds may be selected and the system may be configured with a thermostat (not shown) to advantageously keep the display within an acceptable temperature range. This would save on both energy costs as well as the useful lifetime of the devices.

[0027] An optional air filter (not shown) may be employed within the plenum to assist in preventing contaminants and dust from entering the first gas chamber 30. An air filter could also be used to prevent fan 60 from drawing in particulates from either the surrounding environment or the conditioning unit.

[0028] It should be noted, that some embodiments may not use display technology that requires a backlight. For these types of displays, the electronic display 80 would be placed anterior to the rear cooling chamber 40 (rather than the backlight 140). For

example, an OLED may be placed anterior to the rear cooling chamber 40 so that cooling air could be forced between the posterior surface of the OLED and the rear cooling chamber 40.

[0029] Having shown and described the preferred embodiments, those skilled in the art will realize that many variations and modifications may be made to affect the embodiments and still be within the scope of the claimed invention. Additionally, many of the elements indicated above may be altered or replaced by different elements which will provide the same result and fall within the spirit of the claimed invention. It is the intention, therefore, to limit the invention only as indicated by the scope of the claims.

CLAIMS

I claim:

1. An electronic display assembly comprising:
 - a housing;
 - an electronic display positioned within the housing;
 - wherein the electronic display is cooled by a combination of a closed loop of isolated gas and an open loop of ambient air which passes through the housing.
2. The electronic display assembly of claim 1 wherein:
 - the isolated gas cools a front surface of the electronic display while the ambient air cools a rear surface of the electronic display.
3. The electronic display assembly of claim 2 wherein:
 - the rear surface of the electronic display comprises the rear surface of an LED backlight.
4. The electronic display assembly of claim 1 wherein:
 - the closed loop of isolated gas is not permitted to mix with the open loop of ambient air.
5. The electronic display assembly of claim 1 wherein:
 - the closed loop of isolated gas flows in a direction that is substantially perpendicular to the direction in which the open loop of ambient air flows.
6. The electronic display assembly of claim 1 wherein:
 - the closed loop of isolated gas forms a continuous loop and the open loop of ambient air flows through the loop.

7. The electronic display assembly of claim 1 wherein:
the closed loop of isolated gas is substantially horizontal while the open loop of ambient air is substantially vertical.
8. The electronic display assembly of claim 1 wherein:
the closed loop of isolated gas is partially defined by a sealed rear plenum that does not allow open loop ambient air to enter the plenum.
9. The electronic display assembly of claim 8 further comprising:
one or more electronic devices for operating the electronic display positioned within the sealed plenum.
10. The electronic display assembly of claim 1 wherein:
the electronic display is a liquid crystal display.
11. The electronic display assembly of claim 1 wherein:
the closed loop of isolated gas is substantially prohibited from exiting the housing.
12. An electronic display assembly comprising:
a housing;
a liquid crystal display (LCD) positioned within the housing and having a backlight;
wherein the electronic display is cooled by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.
13. The electronic display assembly of claim 12 wherein:
the isolated gas cools a front surface of the LCD.
14. The electronic display assembly of claim 12 further comprising:

a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas; and
wherein the open loop ambient air contacts an exterior surface of the chamber, but is not permitted to enter the chamber.

15. The electronic display assembly of claim 12 further comprising:
one or more electronic components for driving the LCD positioned within the rear cooling chamber.

16. The electronic display assembly of claim 12 wherein:
the open loop of ambient air contacts an exterior surface of the rear cooling chamber while the closed loop of isolated gas contacts an interior surface of the rear cooling chamber.

17. The electronic display assembly of claim 12 further comprising:
the closed loop of isolated gas flows in a direction that is substantially perpendicular to the direction in which the open loop of ambient air flows.

18. An electronic display assembly comprising:
a housing;
an electronic display positioned within the housing;
a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display;
a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface;
wherein the front surface of the electronic display is cooled by a closed loop of isolated gas and the rear surface of the electronic display is cooled by an open loop of ambient air.

19. The electronic display assembly of claim 18 wherein:

the open loop of ambient air passes through the housing without mixing with the closed loop of isolated gas.

20. The electronic display assembly of claim 18 wherein:

the open loop of ambient air passes between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.

ABSTRACT

An electronic display assembly is disclosed herein. An electronic display may be positioned within a housing where the display is cooled by a combination of airflows. A closed loop of isolated gas may be used with an open loop of ambient air which passes through the housing in order to cool the display. Preferably, the closed loop of isolated gas cools the front surface of the display while the open loop of ambient air cools the rear surface of the display. Preferably, the closed loop of isolated gas is not permitted to mix with the open loop of ambient air.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
First Named Inventor/Applicant Name:		William DUNN		
Filer:		Tyler Steven Dunham/Kimberly Hefner		
Attorney Docket Number:		MAN2241-010L		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1600

Electronic Acknowledgement Receipt

EFS ID:	26041923
Application Number:	15180968
International Application Number:	
Confirmation Number:	7433
Title of Invention:	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate
First Named Inventor/Applicant Name:	William DUNN
Customer Number:	8698
Filer:	Tyler Steven Dunham/Kimberly Hefner
Filer Authorized By:	Tyler Steven Dunham
Attorney Docket Number:	MAN2241-010L
Receipt Date:	13-JUN-2016
Filing Date:	
Time Stamp:	17:26:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$1600
RAM confirmation Number	4604
Deposit Account	194076
Authorized User	Hefner, Kimberly

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	WebADS.pdf	177326	no	10
			ccc3ba3118f1312506255e82999169abb250ec		
Warnings:					
Information:					
2	Oath or Declaration filed	20131205_DecAssign_MAN2241-010I.pdf	176908	no	2
			9c4cbd0a3a1c8a21ef0f16ab855f36dc7f46c3c6		
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3	Power of Attorney	20141007_POA_MAN2241-010J.pdf	234103	no	2
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Warnings:					
Information:					
4	Drawings-only black and white line drawings	20160613_Draw_MAN2241-010L.pdf	256446	no	3
			0caec2536f9e9c62b607b56740fc680a9d13604a		
Warnings:					
Information:					
5		20160613_App_MAN2241-010L.pdf	67784	yes	16
			15216088de0ac8436432f8e9e5b9c21cdea9b5c		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	11	
	Claims		12	15	
	Abstract		16	16	
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	35066	no	2
			58baa7c02b7e9cc0d8f8d0c630c1afeab7155727		

Warnings:**Information:****Total Files Size (in bytes):**

947633

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

Inventor Information:

Inventor 1				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	William		DUNN	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Alpharetta	State/Province	GA	Country of Residence ⁱ
				US
Mailing Address of Inventor:				
Address 1	6415 Shiloh Road East			
Address 2				
City	Alpharetta	State/Province	GA	
Postal Code	30005	Country ⁱ	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <div style="float: right;"><input type="button" value="Add"/></div>				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	8698		
Email Address	standleydocketing@standleyllp.com	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

Application Information:

Title of the Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
Attorney Docket Number	MAN2241-010L	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	3	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).

Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:					
<input checked="" type="radio"/> Customer Number		<input type="radio"/> US Patent Practitioner		<input type="radio"/> Limited Recognition (37 CFR 11.9)	
Customer Number		08698			
Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Registration Number					
Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Registration Number					
Additional Representative Information blocks may be generated within this form by selecting the Add button.					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
	Continuation of	14803848	2015-07-20		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14803848	Continuation of	14508767	2014-10-07	9089079	2015-07-21
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14508767	Continuation of	13937777	2013-07-09	8854572	2014-10-07
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13937777	Continuation of	13605530	2012-09-06	8482695	2013-07-09
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13605530	Continuation of	12620330	2009-11-17	8274622	2012-09-25
Prior Application Status		Pending		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12620330	Claims benefit of provisional	61115333	2008-11-17		
Prior Application Status		Patented		Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12620330	Continuation in part of	12234307	2008-09-19	8767165	2014-07-01

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12234307	Claims benefit of provisional	61033064	2008-03-03		
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12620330	Continuation in part of	12234360	2008-09-19		
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12234360	Claims benefit of provisional	61053713	2008-05-16		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12620330	Continuation in part of	12237365	2008-09-24	8879042	2014-11-04
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12237365	Claims benefit of provisional	61057599	2008-05-30		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12620330	Continuation in part of	12411925	2009-03-26	8854595	2014-10-07
Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12411925	Claims benefit of provisional	61039454	2008-03-26		

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Prior Application Status	Abandoned		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12620330	Continuation in part of	12235200	2008-09-22		
Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12235200	Claims benefit of provisional	61076126	2008-06-26		
Prior Application Status	Patented		Remove		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
12620330	Continuation in part of	12556029	2009-09-09	8373841	2013-02-12
Prior Application Status	Pending		Remove		
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)		
12556029	Claims benefit of provisional	61095615	2008-09-09		
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.					

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Access Code ² (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>			

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor
<input type="radio"/> Person to whom the inventor is obligated to assign.	<input type="radio"/> Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	
---	--

If the Applicant is an Organization check here. ☒

Organization Name	Manufacturing Resources International, Inc.
-------------------	---

Mailing Address Information For Applicant:

Address 1	6415 Shiloh Road East		
Address 2			
City	Alpharetta	State/Province	GA
Country ¹	US	Postal Code	30005
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
If the Assignee or Non-Applicant Assignee is an Organization check here. <input type="checkbox"/>				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	MAN2241-010L
		Application Number	
Title of Invention	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Tyler S. Dunham/			Date (YYYY-MM-DD)	
First Name	Tyler	Last Name	Dunham	Registration Number	60364
Additional Signature may be generated within this form by selecting the Add button.					

COMBINED ASSIGNMENT AND DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**Title of
Invention**

System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

DECLARATION

As the below named inventor, I hereby declare that:

This declaration ☐ The attached application, or
is directed to:☒ United States application or PCT international application number
13/937,777 filed on 09-JUL-2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

ASSIGNMENT

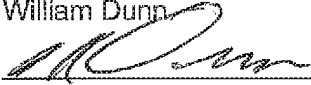
For at least one U.S. dollar (\$1.00) and for other good and valuable consideration, the receipt of which is hereby acknowledged, I hereby sell, assign and transfer to Manufacturing Resources International, Inc., a corporation organized under the law of the State of Georgia having an office at 6415 Shiloh Road East, Alpharetta, GA 30005, (hereinafter referred to as the Assignee) my entire right, title and interest, together with all rights of priority, in and to the invention set forth in the above-identified application. I further hereby sell, assign and transfer to the Assignee my entire right, title and interest, together with all rights of priority, in and to my invention as described and/or claimed in any and all applications for patents based on the invention, including divisionals, continuations, renewals, substitutes and reissues thereof, and all rights of priority resulting from any of these patent applications, as well as all foreign counterparts and extensions thereof, together with all patents issuing on any of these applications for the full terms of all of the patents which may be granted on the invention.

I authorize the Assignee to make applications for, to prosecute such applications, and to receive patents for the invention in the United States and any foreign countries, in the Assignee's name.

I promise and agree that I will execute or procure any further necessary assurance of title to the invention and any patents which may issue on the invention. I will, at any time, upon the request and without further consideration, but at the expense of the Assignee, deliver any testimony in any legal proceedings and execute all papers and do all other things that may be necessary or desirable to perfect the title to the invention, or any patents which may be granted therefor, to the Assignee, its successors, assigns, or other legal representatives. I will, at any time, upon the request and at the expense of the Assignee, execute any continuations, divisionals, reissues, or any other additional applications for patents for the invention or any part or parts thereof and any patents issuing thereon are hereby assigned to the Assignee. I will make all rightful oaths, and do all lawful acts required for procuring and enforcing any of the patents, without further compensation, but at the expense of the Assignee, its successors, assigns or other legal representatives.

I authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the

Standley Law Group LLP
Attorney Docket No. MAN241-0101

United States for the invention, resulting from any of the aforesaid applications to the Assignee.	
LEGAL NAME OF INVENTOR	
Inventor: William Dunn	
Signature: 	Date: 12-2-13
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional form for each additional inventor.	

Advice from Standley Law Group LLP: It is advisable to obtain two witness signatures to the above inventor signature in the places indicated below, OR in the alternative, it is advisable to obtain a notarization of the above inventor signature in the notary section set forth below. With or without the witness signatures or the notarization, this assignment is a legally binding agreement to assign the invention to the assignee.

Optional (but advisable) witness signatures:

Witness One

Printed Full Legal Name: _____

Signature: _____

Date: _____

Witness Two

Printed Full Legal Name: _____

Signature: _____

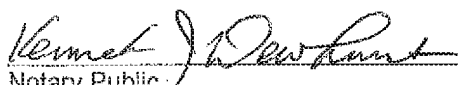
Date: _____

Or, optional (but advisable) notarization:

STATE OF Georgia :
COUNTY OF Cherokee : SS.

Before me personally appeared William Dunn, to me known to be the same person described in and who executed the foregoing instrument, and acknowledged that he/she executed the same, of his/her own free will and for the purposes set forth. Sworn to before me and subscribed in my presence this 2nd day of December, 2013.

(seal)


Notary Public

PATENT ASSIGNMENT COVER SHEETElectronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3915485

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT
CONVEYING PARTY DATA	
Name	Execution Date
WILLIAM DUNN	12/02/2013
RECEIVING PARTY DATA	
Name:	MANUFACTURING RESOURCES INTERNATIONAL, INC.
Street Address:	6415 SHILOH ROAD EAST
City:	ALPHARETTA
State/Country:	GEORGIA
Postal Code:	30005
PROPERTY NUMBERS Total: 1	
Property Type	Number
Application Number:	15180968
CORRESPONDENCE DATA	
Fax Number:	(614)792-5536
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
Phone:	6147925555
Email:	standleydocketing@standleyllp.com
Correspondent Name:	STANDLEY LAW GROUP LLP
Address Line 1:	6300 RIVERSIDE DRIVE
Address Line 4:	DUBLIN, OHIO 43017
ATTORNEY DOCKET NUMBER:	MAN2241-010L
NAME OF SUBMITTER:	TYLER S. DUNHAM
SIGNATURE:	/Tyler S. Dunham/
DATE SIGNED:	06/13/2016
This document serves as an Oath/Declaration (37 CFR 1.63).	
Total Attachments: 2	
source=20131205_DecAssign_MAN2241-010I#page1.tif	
source=20131205_DecAssign_MAN2241-010I#page2.tif	

COMBINED ASSIGNMENT AND DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)**Title of
Invention**

System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

DECLARATION

As the below named inventor, I hereby declare that:

This declaration ☐ The attached application, or
is directed to:☒ United States application or PCT international application number
13/937,777 filed on 09-JUL-2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

ASSIGNMENT

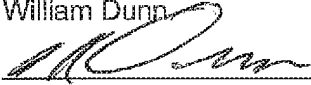
For at least one U.S. dollar (\$1.00) and for other good and valuable consideration, the receipt of which is hereby acknowledged, I hereby sell, assign and transfer to Manufacturing Resources International, Inc., a corporation organized under the law of the State of Georgia having an office at 6415 Shiloh Road East, Alpharetta, GA 30005, (hereinafter referred to as the Assignee) my entire right, title and interest, together with all rights of priority, in and to the invention set forth in the above-identified application. I further hereby sell, assign and transfer to the Assignee my entire right, title and interest, together with all rights of priority, in and to my invention as described and/or claimed in any and all applications for patents based on the invention, including divisionals, continuations, renewals, substitutes and reissues thereof, and all rights of priority resulting from any of these patent applications, as well as all foreign counterparts and extensions thereof, together with all patents issuing on any of these applications for the full terms of all of the patents which may be granted on the invention.

I authorize the Assignee to make applications for, to prosecute such applications, and to receive patents for the invention in the United States and any foreign countries, in the Assignee's name.

I promise and agree that I will execute or procure any further necessary assurance of title to the invention and any patents which may issue on the invention. I will, at any time, upon the request and without further consideration, but at the expense of the Assignee, deliver any testimony in any legal proceedings and execute all papers and do all other things that may be necessary or desirable to perfect the title to the invention, or any patents which may be granted therefor, to the Assignee, its successors, assigns, or other legal representatives. I will, at any time, upon the request and at the expense of the Assignee, execute any continuations, divisionals, reissues, or any other additional applications for patents for the invention or any part or parts thereof and any patents issuing thereon are hereby assigned to the Assignee. I will make all rightful oaths, and do all lawful acts required for procuring and enforcing any of the patents, without further compensation, but at the expense of the Assignee, its successors, assigns or other legal representatives.

I authorize and request the Commissioner of Patents and Trademarks to issue any and all Letters Patent of the

Standley Law Group LLP
Attorney Docket No. MAN241-0101

United States for the invention, resulting from any of the aforesaid applications to the Assignee.	
LEGAL NAME OF INVENTOR	
Inventor: William Dunn	
Signature: 	Date: 12-2-13
Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional form for each additional inventor.	

Advice from Standley Law Group LLP: It is advisable to obtain two witness signatures to the above inventor signature in the places indicated below, OR in the alternative, it is advisable to obtain a notarization of the above inventor signature in the notary section set forth below. With or without the witness signatures or the notarization, this assignment is a legally binding agreement to assign the invention to the assignee.

Optional (but advisable) witness signatures:

Witness One

Printed Full Legal Name: _____

Signature: _____

Date: _____

Witness Two

Printed Full Legal Name: _____

Signature: _____

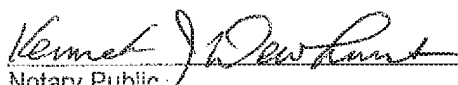
Date: _____

Or, optional (but advisable) notarization:

STATE OF Georgia :
COUNTY OF Cherokee : SS.

Before me personally appeared William Dunn, to me known to be the same person described in and who executed the foregoing instrument, and acknowledged that he/she executed the same, of his/her own free will and for the purposes set forth. Sworn to before me and subscribed in my presence this 2nd day of December, 2013.

(seal)


Notary Public



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/180,968	06/13/2016	2621	1600	MAN2241-010L	20	3

CONFIRMATION NO. 7433

FILING RECEIPT



0000000084100069

8698
 STANDLEY LAW GROUP LLP
 6300 Riverside Drive
 Dublin, OH 43017

Date Mailed: 07/06/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

William DUNN, Alpharetta, GA;

Applicant(s)

Manufacturing Resources International, Inc., Alpharetta, GA;

Power of Attorney: The patent practitioners associated with Customer Number 08698

Domestic Priority data as claimed by applicant

This application is a CON of 14/803,848 07/20/2015 PAT 9370127
 which is a CON of 14/508,767 10/07/2014 PAT 9089079
 which is a CON of 13/937,777 07/09/2013 PAT 8854572
 which is a CON of 13/605,530 09/06/2012 PAT 8482695
 which is a CON of 12/620,330 11/17/2009 PAT 8274622
 which claims benefit of 61/115,333 11/17/2008
 and is a CIP of 12/234,307 09/19/2008 PAT 8767165
 which claims benefit of 61/033,064 03/03/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/234,360 09/19/2008
 which claims benefit of 61/053,713 05/16/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/237,365 09/24/2008 PAT 8879042
 which claims benefit of 61/057,599 05/30/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/411,925 03/26/2009 PAT 8854595
 which claims benefit of 61/039,454 03/26/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/235,200 09/22/2008 ABN

page 1 of 4

MRI00320739

which claims benefit of 61/076,126 06/26/2008
and said 12/620,330 11/17/2009
is a CIP of 12/556,029 09/09/2009 PAT 8373841
which claims benefit of 61/095,615 09/09/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 06/30/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/180,968**

Projected Publication Date: 10/13/2016

Non-Publication Request: No

Early Publication Request: No

Title

System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

Preliminary Class

345

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application

serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/180,968			
APPLICATION AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	600		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720		
TOTAL CLAIMS (37 CFR 1.16(i))	20	minus 20 = *				x 80 =	0.00		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3	minus 3 = *				x 420 =	0.00		
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00		
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00		
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600		
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=		x	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x	=	
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
			TOTAL ADD'L FEE				TOTAL ADD'L FEE		
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=		x	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x	=	
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
			TOTAL ADD'L FEE				TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.									



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/180,968	06/13/2016	William DUNN	MAN2241-010L	7433
8698	7590	09/22/2016		
STANDLEY LAW GROUP LLP 6300 Riverside Drive Dublin, OH 43017			EXAMINER KIM, RICHARD H	
			ART UNIT	PAPER NUMBER
			2871	
			NOTIFICATION DATE	DELIVERY MODE
			09/22/2016	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

standleydocketing@standleyllp.com

Office Action Summary	Application No. 15/180,968	Applicant(s) DUNN, WILLIAM	
	Examiner RICHARD KIM	Art Unit 2871	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on 6/13/16.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☒ Claim(s) 1-20 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☒ Claim(s) 12-20 is/are allowed.

7) ☒ Claim(s) 1,2,4,5 and 8-11 is/are rejected.

8) ☒ Claim(s) 3,6 and 7 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10) ☐ The specification is objected to by the Examiner.

11) ☒ The drawing(s) filed on 6/13/16 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some** c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

4) ☐ Other: _____.

Application/Control Number: 15/180,968
Art Unit: 2871

Page 2

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim(s) 1, 2, 4 and 8-11 is/are rejected under pre-AIA 35 U.S.C. 102(b) as being by Fujimori (JP 2001-209126 A).
4. Re claim 1, Fujimori discloses a device comprising a housing (Fig. 10); an electronic display (925G) positioned within the housing; wherein the electronic display is cooled by a combination of a closed loop (1180) of isolated gas and an open loop of ambient air (air flow created by fan 15a) which passes through the housing (Figs. 9, 10).
5. Re claim 2, Fujimori discloses the device wherein the isolated gas (1180) cools a front surface of the electronic display (925G) while the ambient air cools a rear surface of the electronic display. Both the isolated gas and the ambient air collectively cool the optical unit (9), which contains the electronic display (925G, 925B, or 925R). Therefore, the isolated gas and the ambient air would both contribute to cooling front and rear surfaces of the electronic display.
6. Re claim 4, Fujimori discloses the device wherein the closed loop of isolated gas (1180) is not permitted to mix with the open loop of ambient air (Fig. 10).

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7. Re claim 8, Fujimori discloses the device wherein the closed loop of isolated gas is partially defined by a sealed rear plenum (9) that does not allow open loop ambient air to enter the plenum.

8. Re claim 9, Fujimori discloses the device comprising one or more electronic devices (925G) for operating the electronic display positioned within the sealed plenum.

9. Re claim 10, Fujimori discloses the device wherein the electronic display (925G) is a liquid crystal display (abstract)

10. Re claim 11, Fujimori discloses the device wherein the closed loop of isolated gas (1180) is substantially prohibited from exiting the housing (9) (Fig. 10).

Claim Rejections - 35 USC § 103

11. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claim 5 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Fujimori.

13. Fujimori does not explicitly disclose the device wherein the closed loop of isolated gas flows in a direction that is substantially perpendicular to the direction in which the open loop of ambient air flows.

14. It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ the device wherein the closed loop of isolated gas flows in a

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direction that is substantially perpendicular to the direction in which the open loop of ambient air flows. As show in Fig. 1, the device is a three-dimensional device. Air flowing through the device would flow three-dimensionally in multiple directions. Therefore, some gas flowing through the closed loop would naturally flow in a direction that is substantially perpendicular to the direction in which the open loop of ambient air flows at least momentarily.

Allowable Subject Matter

15. Claims 12-20 allowed.

16. Claims 3, 6 and 7 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD KIM whose telephone number is (571)272-2294. The examiner can normally be reached on 9:00-6:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Caley can be reached on 571-272-2286. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Page 5

Art Unit: 2871

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RICHARD KIM/

Primary Examiner, Art Unit 2871

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	23	("20060132699" "20060209266" "20070151664" "20020101553" "20020126248" "20030007109" "20040036834" "20040165139" "8083285" "5869919" "7059757" "20060132699").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 19:52
L2	24	("4093355" "4593978" "4634225" "5029982" "5088806" "5247374" "5559614" "5767489").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 19:53
L3	24	("5748269" "5818010" "6089751" "6157432" "6191839" "6417900" "6535266" "6628355" "6839104" "6885412" "6943768").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 19:54
L4	10	("20020101553" "20020126248" "20030007109" "20040036834" "20040165139").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:02
L5	12	("6493440" "20070103866" "20050012722" "20070212211" "20030104210" "20060082271").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:09
L6	16	("20010001459" "20010019454" "20040105159" "20050073632" "20070206158" "20020033919" "20060177587" "20060092348").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:10
L7	6	("6392727" "6909486" "6961108").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:11
L8	15	("5991153" "6392727" "6961108" "6909486" "7083285" "5869919" "7059757").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:12
L9	12	("20030007109" "20040036834" "20040165139" "20060132699" "20060209266" "20070151664" "20060132699").pn.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/18 20:13
S1	1	("5991153").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	OFF	2016/09/14 17:42


S2	243	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and (fan near5 (ambient outside) near5 (cool\$5 air flow))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/14 17:57
S3	98	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and (fan near5 (ambient outside) near5 (cool\$5 air flow)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/14 17:59
S4	51	(display) near5 (loop near5 air)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/14 18:11
S5	2729	(display) near5 (cool\$5 near5 air)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/14 18:12
S6	1702	(display) near5 (cool\$5 near5 air) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/14 18:13
S7	26	("20070081109" "4980848" "5869919" "5971566" "6104451" "6198222" "6833674" "7164586" "7224121" "7269009" "7369400").PN. OR ("7667964").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/14 18:17
S8	80	("4563617" "4899080" "4952925" "5185554" "5313362" "5345362" "5499868").PN. OR ("5869919").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/14 19:22
S9	26	("20070081109" "4980848" "5869919" "5971566" "6104451" "6198222" "6833674" "7164586" "7224121" "7269009" "7369400").PN. OR ("7667964").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/14 19:28
S10	51	("20030020152" "20030068487" "20050078446" "4442450" "4689720" "5268815" "5287001" "5971566" "6043981" "6049469" "6381124" "6388189" "6504713" "6870738").PN. OR ("7164586").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/14 19:30
S11	16229	((liquid adj crystal adj display) LCD) and ((air flow) near5 (cool cooling dissipat\$5))	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/15 16:51
S12	8375	((liquid adj crystal adj display) LCD) and ((air flow) near5 (cool cooling dissipat\$5)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/15 16:52
S13	2612	((liquid adj crystal adj display) LCD) and ((air flow) near5 (cool cooling dissipat\$5)) and ((air gas) near5 (outside ambient)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/15 17:26
S14	7068	((liquid adj crystal adj display) LCD) and (closed adj loop) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/15 18:21
S15	112	((liquid adj crystal adj display) LCD) and	US-PGPUB;	OR	ON	2016/09/15

		((closed adj loop) near5 (air gas)) and @ad<"20080909"	USPAT; USOCR			18:21
S16	12	((liquid adj crystal adj display) LCD) and ((loop near5 gas) near5 cool\$5) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/16 11:21
S17	17	"6474410"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/16 11:33
S18	2	("5991153" "6226180").pn.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/16 11:35
S19	79848	("349").CLAS.	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	OFF	2016/09/16 13:09
S20	79848	("349").CLAS.	US-PGPUB; USPAT; USOCR; EPO; JPO	OR	OFF	2016/09/16 15:37
S21	932	S20 and projector and prism and (crystal near5 valve)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/16 15:37
S22	0	S20 and projector and prism and ((crystal near5 valve) near5 backlight)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/16 15:38
S23	0	S20 and projector and prism and ((crystal near5 valve) near5 backlight)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/16 15:38
S24	97	S20 and projector and prism and (crystal near5 valve) and backlight	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2016/09/16 15:40

EAST Search History (Interference)

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9/ 18/ 2016 8:19:13 PM**C:\Users\rkim3\Documents\EAST\Workspaces\15180968.wsp**

Search Notes 	Application/Control No. 15180968	Applicant(s)/Patent Under Reexamination DUNN, WILLIAM
	Examiner RICHARD KIM	Art Unit 2871

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search attached	9/16/2016	RHK

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/180,968	06/13/2016	William DUNN	MAN2241-010L

CONFIRMATION NO. 7433

PUBLICATION NOTICE

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 STANDLEY LAW GROUP LLP
 6300 Riverside Drive
 Dublin, OH 43017



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Title:System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

Publication No.US-2016-0302331-A1

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NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No.: 15/180,968

Confirm. No.: 7433

Filed: 06/13/2016

Examiner: Richard H. Kim

Inventor: William Dunn

Art Unit: 2871

Title: System for Using Constricted
Convection with Closed Loop
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Convection Plate

Attorney
Docket No.: MAN2241-010L

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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RESPONSE TO OFFICE ACTION

The following amendments and remarks are in response to the Office Action mailed on 09/22/2016. It is respectfully requested that the Examiner consider the following amendments and remarks prior to further examination of the present application.

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AMENDMENTS

- **Amendments to the Claims** begin on page 3 of this Response.
- **Remarks/Arguments** begin on page 10 of this Response.

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Amendments to the Claims

The following listing of claims replaces all prior versions and listings of claims in the present application:

Listing of Claims:

1 (currently amended): An electronic display assembly comprising:

~~a~~ an electronic display housing;

a gas-containing closed loop gas cooling chamber located within the electronic display housing;

an electronic display positioned within the electronic display housing but outside of the closed loop gas cooling chamber; and

an open loop ambient air pathway through the electronic display housing;

wherein the electronic display is ~~cooled~~ coolable by a combination of ~~[[a]]~~ gas circulation within the closed loop of isolated gas cooling chamber and an open-loop of ambient air which passes flow through the open loop ambient air pathway in the electronic display housing.

2 (currently amended): The electronic display assembly of claim 1 wherein:

the ~~isolated~~ closed loop gas cooling chamber and the open loop ambient air pathway are positioned such that gas cools circulation within the closed loop gas cooling chamber will cool a front surface of the electronic display while the ambient air ~~cools~~ flow will cool a rear surface of the electronic display.

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3 (original): The electronic display assembly of claim 2 wherein:

the rear surface of the electronic display comprises the rear surface of an LED
backlight.

4 (currently amended): The electronic display assembly of claim 1 wherein:

the gas within the closed loop of isolated gas cooling chamber is ~~not permitted to~~
~~mix with~~ isolated from the open loop of ambient air.

5 (currently amended): The electronic display assembly of claim 1 wherein:

the closed loop of ~~isolated~~ gas cooling chamber and the ambient air pathway are
configured such that gas ~~flows~~ circulation within the gas cooling chamber
will occur in a direction that is substantially perpendicular to the direction ~~in~~
~~which the open loop of that~~ ambient air ~~flows~~ will flow through the electronic
display housing.

6 (currently amended): The electronic display assembly of claim 1 wherein:

the closed loop of ~~isolated~~ gas cooling chamber forms a continuous loop and the
open loop of ambient air ~~flows~~ pathway passes through the loop.

7 (currently amended): The electronic display assembly of claim 1 wherein:

the closed loop of ~~isolated~~ gas cooling chamber is configured such that gas is
circulation therein will occur substantially ~~horizontal~~ horizontally, while the
open loop of ambient air ~~is~~ pathway is configured such that ambient air flow

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through the electronic display housing will occur substantially ~~vertical~~
vertically.

8 (currently amended): The electronic display assembly of claim 1 wherein:

the closed loop of ~~isolated~~ gas cooling chamber is partially defined by a sealed rear plenum that ~~does not allow open loop prevents~~ ambient air ~~to enter~~ from entering the plenum.

9 (original): The electronic display assembly of claim 8 further comprising:

one or more electronic devices for operating the electronic display positioned within the sealed plenum.

10 (currently amended): The electronic display assembly of claim 1 wherein:

the electronic display is selected from the group consisting of a liquid crystal display, a light emitting diode display, an organic light emitting diode display, a field emitting display, a cathode ray tube display, and a plasma display.

11 (currently amended): The electronic display assembly of claim 1 wherein further comprising:

the a gas-circulating fan for circulating the gas within the closed loop of ~~isolated~~ gas cooling chamber, ~~is substantially prohibited from exiting the~~ and a fan for producing a flow of ambient air through the open loop ambient air pathway in the electronic display housing.

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12 (currently amended): An electronic display assembly comprising:

a housing;

a liquid crystal display (LCD) positioned within the housing and having a backlight;

wherein the electronic display is ~~cooled~~ coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight.

13 (currently amended): The electronic display assembly of claim 12 wherein:

the isolated gas ~~cools~~ will cool a front surface of the LCD.

14 (currently amended): The electronic display assembly of claim 12 further comprising:

a rear cooling chamber positioned behind the LCD and containing the closed loop of isolated gas; and

wherein the open loop ambient air ~~contacts~~ will contact an exterior surface of the chamber, but is not permitted to enter the chamber.

15 (original): The electronic display assembly of claim 12 further comprising:

one or more electronic components for driving the LCD positioned within the rear cooling chamber.

16 (currently amended): The electronic display assembly of claim 12 wherein:

the open loop of ambient air ~~contacts~~ will contact an exterior surface of the rear cooling chamber while the closed loop of isolated gas ~~contacts~~ will contact an interior surface of the rear cooling chamber.

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17 (currently amended): The electronic display assembly of claim 12 ~~further comprising~~
wherein:

the intended direction of closed loop of isolated gas ~~flows~~ flow in a direction that is
substantially perpendicular to the intended direction ~~in which the~~ of open
loop of ambient air ~~flows~~ flow.

18 (currently amended): An electronic display assembly comprising:

a housing;

an electronic display positioned within the housing;

a rear cooling chamber positioned behind the electronic display and containing an
electrical component which is electrically connected to the electronic
display;

a front surface on the electronic display which faces an intended viewer and a rear
surface on the electronic display which opposes the front surface;

wherein the front surface of the electronic display is ~~cooled~~ coolable by a closed
loop of isolated gas and the rear surface of the electronic display is ~~cooled~~
coolable by an open loop of ambient air.

19 (currently amended): The electronic display assembly of claim 18 wherein:

the open loop of ambient air ~~passes through the housing without~~ is prohibited from
mixing with the closed loop of isolated gas when it passes through the
housing.

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20 (currently amended): The electronic display assembly of claim 18 wherein:

the open loop of ambient air ~~passes~~ will pass between the rear surface of the electronic display and an exterior surface of the rear cooling chamber.

21 (new): An electronic display assembly comprising:

an electronic display housing;

a closed loop of cooling gas adapted for circulation within the electronic display housing;

an open loop ambient air pathway through the electronic display housing; and

an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway;

wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing.

22 (new): The electronic display assembly of claim 21 wherein:

the closed loop of cooling gas is isolated within a continuous loop gas cooling chamber, and the open loop ambient air pathway is configured to direct the ambient air over an exterior surface of the gas cooling chamber when it flows through the electronic display housing.

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23 (new): The electronic display assembly of claim 22 further comprising:

a fan located within the electronic display housing, the fan configured and oriented to move air located within the housing between a surface of the continuous loop gas cooling chamber and a rear surface of the electronic display.

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REMARKS/ARGUMENTS

In the Claims:

Claims 1-20 were pending in the application as of the mailing date of the current Office Action, with Claims 1, 2, 4, 5 and 8-11 being rejected, Claims 3, 6 and 7 being objected to, and Claims 12-20 being allowed. New Claims 21-23 have been added, and no claims have been canceled. Consequently, Claims 1-23 are now pending in the application.

Since all claims of the present application are entitled to a filing date before March 16, 2013, the effective date for changes to 35 USC § 102 under the “America Invents Act” (AIA), all references to 35 USC § 102 made herein will be to the pre-AIA version of 35 USC § 102.

Rejection of Claims 1, 2, 4 and 8-11 Under 35 U.S.C. § 102(b)

The Examiner rejected Claims 1, 2, 4 and 8-11 under 35 U.S.C. § 102(b) as being anticipated by Fujimori (JP 2001-209126 A). The rejection is respectfully traversed.

The rejected claims have been amended herein to clarify that:

- the recited closed loop of gas is contained within a closed loop gas cooling chamber located within the electronic display housing;
- the electronic display is positioned within the electronic display housing but *outside of* the closed loop gas cooling chamber; and
- there is an open loop ambient air pathway through the electronic display housing.

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It is respectfully submitted that Fujimori does not teach such an electronic display assembly.

Upon review of a machine-translated version of the Fujimori reference, as well as US 6,007,205, which is believed to be an English language version of the Japanese specification, it generally appears that Fujimori teaches a projector having a cooled optical lens unit. There are numerous differences between the teachings of Fujimori and the subject matter of the rejected claims.

One obvious difference between the teachings of Fujimori and the subject matter of the rejected claims is that Fujimori is directed to cooling a few small internal components of a projector while the rejected claims are directed to an electronic display assembly wherein an entire electronic display may be cooled. As pointed out in the subject application, such electronic displays may have screens that are, for example, 55 inches and larger in size. Thus, the teachings of Fujimori do not appear particularly applicable to the electronic displays of the subject application.

The Examiner specifically refers to the (green, blue and red) liquid crystal light valves (925) of Fujimori – which are operative to modulate each color of light passing therethrough and to pass the modulated light on to the prism unit (910) – as teaching such a cooled electronic display. While Applicant respectfully disagrees that the liquid crystal light valves of Fujimori are the equivalent of the electronic display of the rejected claims, Fujimori nonetheless fails to anticipate the rejected claims even if such equivalence is accepted for the sake of argument.

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As can be observed in the representative drawing of JP 2001-209126 A and in FIGS. 9-14 of US 6,007,205, the Fujimori projector always locates the liquid crystal light valves (925) within a sealed and airtight optical lens unit (9). (See, e.g., col. 13, l. 64 to col. 14, l. 3 of Fujimori '205). Air is circulated within the sealed optical lens unit (9) by a circulation fan (15B) that is also located within the sealed optical lens unit. An air circulation current (1180) – i.e., a closed loop of cooling gas – created by the fan (15B) passes over the liquid crystal light valves (925) and also contacts an underside of a top seal plate (991) that seals a top opening of the optical lens unit (9). (See, e.g., col. 14, ll. 4-12 of Fujimori '205). A separate intake fan (15A), which is located entirely outside of the sealed optical lens unit (9), draws outside air into the projector case and passes the outside air over a top side of the top seal plate (991). This allegedly (convectively) cools the top seal plate (991), and also (conductively) cools the circulating air within the sealed optical lens unit (9). (See, e.g., col. 14, ll. 13-20 of Fujimori '205).

Notably, in each projector embodiment of Fujimori, the liquid crystal light valves (925) that the Examiner equates with the electronic display of the rejected claims, is located within the sealed optical lens unit (9) and is in direct contact with the air circulation current (1180) – i.e., a closed loop of cooling gas – located therein. Consequently, the liquid crystal light valves (925) are also isolated from any contact with the ambient air flow created by the separate intake fan (15A).

In contrast to the constructions taught by Fujimori, it is now clarified in the rejected claims as amended that the closed loop of cooling gas is contained within a closed loop gas cooling chamber located within the electronic display housing and that, while the

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electronic display is also located within the electronic display housing, the electronic display is positioned *outside of* the closed loop gas cooling chamber. It is also now specified that the claimed electronic display assembly includes an open loop ambient air pathway through the electronic display housing. Thus, the electronic display of the rejected claims is not in contact with the cooling gas located within the gas cooling chamber, but may be contactable by ambient air that is passed through the electronic display housing. This is in direct contrast to the projector designs of Fujimori, where the liquid crystal light valves (925) are located entirely within the sealed optical lens unit (9), are in direct contact with the air circulation current (1180) produced therein, and are isolated from any contact with the ambient air flow produced by the intake fan (15A).

From the foregoing remarks, it can be understood that there are significant differences between the teachings of Fujimori and the subject matter of the rejected claims as amended. Consequently, it is submitted that Fujimori cannot support a rejection of Claims 1, 2, 4 and 8-11 under 35 U.S.C. § 102(b), and withdrawal of said rejection is accordingly requested.

Rejection of Claim 5 Under 35 U.S.C. § 103(a)

The Examiner rejected Claim 5 under 35 U.S.C. § 103(a) as being unpatentable over Fujimori. Amended independent Claim 1 is believed to be allowable, as discussed above. As such, Claim 5, which depends therefrom, would also be allowable.

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New Claims 21-23

New Claims 21-23 are believed to be allowable over Fujimori for the same reasons articulated above in response to the Examiner's rejection of Claims 1, 2, 4 and 8-11.

Allowable Subject Matter

The Examiner's allowance of Claims 12-20 is noted and appreciated. Claims 12-14 and 16-20 have been amended herein only to avoid any possible mixture of method and apparatus (assembly) claims. No substantive changes have been made to any of the allowed claims.

CONCLUSION

The rejected claims have been amended to more clearly describe the subject matter recited therein, and new Claims 21-23 have been added. The subject matter of the rejected claims has also been distinguished over the teachings of the reference cited as prior art by the Examiner.

Therefore, it is respectfully submitted that the application is now in condition for allowance, and such action is earnestly requested. Telephone inquiry to the undersigned in order to clarify or otherwise expedite prosecution of the application is encouraged.

Respectfully submitted,

Date: 12/21/2016

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Inventor: William Dunn

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Electronic Patent Application Fee Transmittal				
Application Number:		15180968		
Filing Date:		13-Jun-2016		
Title of Invention:		System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
First Named Inventor/Applicant Name:		William DUNN		
Filer:		Eric Michael Gayan/Trisha Beachy-Bryant		
Attorney Docket Number:		MAN2241-010L		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1202	3	80	240
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	420	420
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				660

Electronic Acknowledgement Receipt

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Application Number:	15180968
International Application Number:	
Confirmation Number:	7433
Title of Invention:	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate
First Named Inventor/Applicant Name:	William DUNN
Customer Number:	8698
Filer:	Eric Michael Gayan/Trisha Beachy-Bryant
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Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 660
RAM confirmation Number	122116INTEFSW00008979194076
Deposit Account	194076
Authorized User	Trisha Beachy-Bryant

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		1stResponsetoOAof9-22-16_M AN2241-010L_12-21-16.pdf	67828	yes	15
			ab65a45f5427d6a20bfff6936527ceb3a473f45d0		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Amendment/Req. Reconsideration-After Non-Final Reject		1	2	
	Claims		3	9	
	Applicant Arguments/Remarks Made in an Amendment		10	15	
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32318	no	2
			f2daaf4ade8835e4efa524146c067285dda0e4ab		
Warnings:					
Information:					
Total Files Size (in bytes):			100146		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/180,968		Filing Date 06/13/2016		<input type="checkbox"/> To be Mailed	
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO									
APPLICATION AS FILED – PART I									
(Column 1)		(Column 2)							
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)	
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A			
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A		N/A		N/A			
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A			
TOTAL CLAIMS (37 CFR 1.16(j))		minus 20 =		*		X \$ =			
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL			
APPLICATION AS AMENDED – PART II									
(Column 1)		(Column 2)		(Column 3)					
AMENDMENT	12/21/2016	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	* 23	Minus	** 20	= 3	X \$80 =		240	
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	X \$420 =		0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		240	
(Column 1)		(Column 2)		(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(j))	*	Minus	**	=	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =			
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>									

LIE
SHEILA D. CHAPMAN

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

8698 7590 02/17/2017
 STANDLEY LAW GROUP LLP
 6300 Riverside Drive
 Dublin, OH 43017

EXAMINER

KIM, RICHARD H

ART UNIT

PAPER NUMBER

2871

DATE MAILED: 02/17/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/180,968	06/13/2016	William DUNN	MAN2241-010L	7433

TITLE OF INVENTION: System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	05/17/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

8698 7590 02/17/2017
STANDLEY LAW GROUP LLP
6300 Riverside Drive
Dublin, OH 43017

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/180,968	06/13/2016	William DUNN	MAN2241-010L	7433

TITLE OF INVENTION: System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	05/17/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
KIM, RICHARD H	2871	349-058000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev. 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/180,968	06/13/2016	William DUNN	MAN2241-010L	7433
8698	7590	02/17/2017	EXAMINER	
STANDLEY LAW GROUP LLP			KIM, RICHARD H	
6300 Riverside Drive			ART UNIT	
Dublin, OH 43017			PAPER NUMBER	
			2871	
DATE MAILED: 02/17/2017				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
 (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/180,968	Applicant(s) DUNN, WILLIAM	
	Examiner RICHARD KIM	Art Unit 2871	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 12/21/16.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-23. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. <input type="checkbox"/> Other _____. |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

Application/Control Number: 15/180,968

Page 2

Art Unit: 2871

1. The present application is being examined under the pre-AIA first to invent provisions.

DETAILED ACTION

Allowable Subject Matter

2. Claims 1-23 allowed.
3. The following is an examiner's statement of reasons for allowance: The prior art of record, taken alone or in combination, fails to teach or disclose, in light of the specifications, **claim 1**) an electronic display assembly comprising an electronic display positioned within the electronic display housing but outside of the closed loop gas cooling chamber; wherein the electronic display is coolable by a combination of gas circulation within the closed loop gas cooling chamber and ambient air flow through the open loop ambient air pathway in the electronic display housing, along with all the other claim limitations; **claim 12**) an electronic display assembly wherein the electronic display is coolable by a combination of a closed loop of isolated gas which circulates within the housing and an open loop of ambient air which passes through the housing and along the backlight, along with all the other claim limitations; **claim 18**) an electronic display assembly comprising a rear cooling chamber positioned behind the electronic display and containing an electrical component which is electrically connected to the electronic display; a front surface on the electronic display which faces an intended viewer and a rear surface on the electronic display which opposes the front surface; wherein the front surface of the electronic display is coolable by a closed loop of isolated gas and the rear surface of the electronic display is coolable by an open loop of ambient air, along with all the other claim

Application/Control Number: 15/180,968

Page 3

Art Unit: 2871

limitations; and **claim 21**) an electronic display assembly comprising an electronic display positioned within the electronic display housing such that the electronic display is isolated from the closed loop of cooling gas but contactable by ambient air flowing through the open loop ambient air pathway; wherein the electronic display is coolable by a combination of closed loop cooling gas circulation within the electronic display housing, and ambient air flow through the open loop ambient air pathway in the electronic display housing, along with all the other claim limitations.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RICHARD KIM whose telephone number is (571)272-2294. The examiner can normally be reached on 9:00-6:30 M-F.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

Application/Control Number: 15/180,968

Page 4

Art Unit: 2871

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Caley can be reached on 571-272-2286. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/RICHARD KIM/

Primary Examiner, Art Unit 2871

Notice of References Cited	Application/Control No. 15/180,968		Applicant(s)/Patent Under Reexamination DUNN, WILLIAM	
	Examiner RICHARD KIM		Art Unit 2871	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-6,007,205 A	12-1999	Fujimori; Motoyuki	G03B21/16	348/E9.027
	B	US-				
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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BIB DATA SHEET

CONFIRMATION NO. 7433

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
15/180,968	06/13/2016 RULE	349	2871	MAN2241-010L

APPLICANTS
 Manufacturing Resources International, Inc., Alpharetta, GA;

INVENTORS
 William DUNN, Alpharetta, GA;

**** CONTINUING DATA *******
 This application is a CON of 14/803,848 07/20/2015 PAT 9370127
 which is a CON of 14/508,767 10/07/2014 PAT 9089079
 which is a CON of 13/937,777 07/09/2013 PAT 8854572
 which is a CON of 13/605,530 09/06/2012 PAT 8482695
 which is a CON of 12/620,330 11/17/2009 PAT 8274622
 which claims benefit of 61/115,333 11/17/2008
 and is a CIP of 12/234,307 09/19/2008 PAT 8767165
 which claims benefit of 61/033,064 03/03/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/234,360 09/19/2008
 which claims benefit of 61/053,713 05/16/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/237,365 09/24/2008 PAT 8879042
 which claims benefit of 61/057,599 05/30/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/411,925 03/26/2009 PAT 8854595
 which claims benefit of 61/039,454 03/26/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/235,200 09/22/2008 ABN
 which claims benefit of 61/076,126 06/26/2008
 and said 12/620,330 11/17/2009
 is a CIP of 12/556,029 09/09/2009 PAT 8373841
 which claims benefit of 61/095,615 09/09/2008


**** FOREIGN APPLICATIONS *******

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
 06/30/2016

Foreign Priority claimed 35 USC 119(a-d) conditions met Verified and Acknowledged	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No /RICHARD H KIM/ Examiner's Signature	<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY GA	SHEETS DRAWINGS 3	TOTAL CLAIMS 20	INDEPENDENT CLAIMS 3
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ADDRESS
 STANDLEY LAW GROUP LLP
 6300 Riverside Drive
 Dublin, OH 43017
 UNITED STATES

TITLE

Search Notes 	Application/Control No. 15180968	Applicant(s)/Patent Under Reexamination DUNN, WILLIAM
	Examiner RICHARD KIM	Art Unit 2871

CPC- SEARCHED		
Symbol	Date	Examiner


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search attached	9/16/2016	RHK
EAST search attached	2/6/2017	RHK

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	claim language search	2/6/2017	RHK

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Issue Classification 	Application/Control No. 15180968	Applicant(s)/Patent Under Reexamination DUNN, WILLIAM	
	Examiner RICHARD KIM	Art Unit 2871	

CPC					
Symbol				Type	Version
H05K	7		20954	F	2013-01-01
G02F	1		133603	I	2013-01-01
H05K	7		20145	I	2013-01-01
H05K	7		20972	I	2013-01-01
G02F	1		133385	I	2013-01-01
H05K	7		20136	I	2013-01-01
G02F	2201		36	A	2013-01-01
H05K	7		20163	I	2013-01-01
H05K	7		202	I	2013-01-01
H05K	7		20209	I	2013-01-01
G02F	1		133308	I	2013-01-01
G02F	1		133615	I	2013-01-01
H05K	7		20127	I	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		Total Claims Allowed:	
(Assistant Examiner)		23	
(Date)			
/RICHARD KIM/	02/06/2017	O.G. Print Claim(s)	O.G. Print Figure
Primary Examiner.Art Unit 2871		1	1
(Primary Examiner)	(Date)		

[illegible]

NONE		Total Claims Allowed:	
		23	
(Assistant Examiner)	(Date)		
/RICHARD KIM/ Primary Examiner.Art Unit 2871	02/06/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

[illegible]

NONE		Total Claims Allowed:	
		23	
(Assistant Examiner)	(Date)		
/RICHARD KIM/ Primary Examiner.Art Unit 2871	02/06/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S35	8380	((liquid adj crystal adj display) LCD) and ((air flow) near5 (cool cooling dissipat\$5)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 22:16
S38	112	((liquid adj crystal adj display) LCD) and ((closed adj loop) near5 (air gas)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 22:19
S37	1702	(display) near5 (cool\$5 near5 air) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 22:19
S36	101	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and (fan near5 (ambient outside) near5 (cool\$5 air flow)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 22:19
S39	443	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and ((cool\$5 heat\$5) near5 (loop chamber flow)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 22:21
S41	399	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and ((ambient outside) near5 (cool\$5 air flow)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 22:28
S40	1023	(h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and ((ambient outside) near5 (cool\$5 air flow))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 22:28
S42	47	("1955899" "4405949" "4529905" "4734613" "5633660").PN. OR ("6504713").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 22:32
S43	12	((liquid adj crystal adj display) LCD) and ((loop near5 gas) near5 cool\$5) and @ad<"20080909"	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 22:34
S44	14	("20050064577" "3957585" "3986297" "4236349" "4676956" "4952511" "5073491" "5555676").PN. OR ("7425441").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/02/06 22:35
S45	3	"20110310482"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 23:14

L1	396	((h05k7/20954 g02f1/133615 g02f1/133385 h05k7/20127 h05k7/20972 g02f1/133308 h05k7/202).cpc. and (cool\$5 near5 fan)) and @ad<"20080909"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT	OR	ON	2017/02/06 23:58
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EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	8	(open adj loop adj ambient adj air).clm.	US-PGPUB; USPAT	OR	ON	2017/02/07 00:00

2/ 7/ 2017 12:01:32 AM
C:\Users\rkim3\ Documents\ EAST\ Workspaces\ 15180968.wsp

Document Description: Issue Fee Payment (PTO-85B)

Issue Fee Transmittal Form

Application Number	Filing Date	First Named Inventor	Atty. Docket No.	Confirmation No.
15180968	13-Jun-2016	William DUNN	MAN2241-010L	7433

TITLE OF INVENTION :

System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate

Entity Status	Application Type	Art Unit	Class - Subclass	EXAMINER
Regular Undiscounted	Utility under 35 USC 111(a)	2871	058000	RICHARD KIM
Issue Fee Due	Publication Due	Total Fee(s) Due	Date Due	Prev. Paid Fee
\$960	\$0	\$960	17-May-2017	\$0

1.Change of Correspondence Address and/or Indication Of Fee Address (37 CFR 1.33 & 1.363)

Current Correspondence Address:	Current Indicated Fee Address :
<p>8698 STANDLEY LAW GROUP LLP</p> <p>6300 Riverside Drive</p> <p>Dublin OH 43017 UNITED STATES 6147925555 standleydocketing@standleyllp.com</p>	
<input type="checkbox"/> Change of correspondence address requested, system generated AIA/122-EFS form attached	<input type="checkbox"/> Fee Address indication requested, system generated SB/47-EFS form attached

2.Entity Status

Change in Entity Status

Applicant certifying micro entity status; system generated Micro Entity certification form attached. See 37 CFR 1.29.

☐ Note: Absent a valid certification of micro entity status, issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. If this box is checked, you will be prompted to choose a micro entity status on the gross income basis (37 CFR 1.29(a)) or the institution of higher education basis (37 CFR 1.29(d)), and make the applicable certification online.

☐ Applicant asserting small entity status. See 37 CFR 1.27.

Note: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☒ Applicant changing to regular undiscounted fee status.

Note: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

Document Description: Issue Fee Payment (PTO-85B)

3.The Following Fee(s) Are Submitted:

☒ Issue Fee

☐ I authorize USPTO to apply my previously paid issue fee to the current fees due

☐ Publication Fee

☐ The Director is hereby authorized to apply my previously paid issue fee to the current fee due and to charge deficient fees to Deposit Account Number _____

☐ Advance Order - # of copies _____

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4.Firm and/or Attorney Names To Be Printed

NOTE: If no name is listed, no name will be printed

For printing on the patent front page, list to be displayed as entered

1. STANDLEY LAW GROUP LLP

2.

3.

5.Assignee Name(s) and Residence Data To Be Printed

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

Name	City	State	Country	Category
Manufacturing Resources International, Inc.	Alpharetta	GEORGIA	united states	corporation

6.Signature

I certify, in accordance with 37 CFR 1.4(d)(4) that I am an attorney or agent registered to practice before the Patent and Trademark Office who has filed and has been granted power of attorney in this application. I also certify that this Fee(s) Transmittal form is being transmitted to the USPTO via EFS-WEB on the date indicated below.

Signature	/Eric M. Gayan/	Date	03-09-2017
Name	Eric Michael Gayan	Registration Number	46103

Electronic Patent Application Fee Transmittal				
Application Number:		15180968		
Filing Date:		13-Jun-2016		
Title of Invention:		System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate		
First Named Inventor/Applicant Name:		William DUNN		
Filer:		Eric Michael Gayan/Trisha Beachy-Bryant		
Attorney Docket Number:		MAN2241-010L		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPL ISSUE FEE	1501	1	960	960
PUBL. FEE- EARLY, VOLUNTARY, OR NORMAL	1504	1	0	0
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	28583874
Application Number:	15180968
International Application Number:	
Confirmation Number:	7433
Title of Invention:	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate
First Named Inventor/Applicant Name:	William DUNN
Customer Number:	8698
Filer:	Eric Michael Gayan/Trisha Beachy-Bryant
Filer Authorized By:	Eric Michael Gayan
Attorney Docket Number:	MAN2241-010L
Receipt Date:	09-MAR-2017
Filing Date:	13-JUN-2016
Time Stamp:	15:07:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$ 960
RAM confirmation Number	031017INTEFSW00001483194076
Deposit Account	194076
Authorized User	Trisha Beachy-Bryant
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>37 CFR 1.20 (Post Issuance fees)</p> <p>37 CFR 1.21 (Miscellaneous fees and charges)</p>	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	Web85b.pdf	46078	no	2
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Warnings:**Information:**

2	Fee Worksheet (SB06)	fee-info.pdf	32661	no	2
			785cb862fc9331e259cdca44998b4071cedb9aea		

Warnings:**Information:**

Total Files Size (in bytes):			78739
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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/180,968	04/18/2017	9629287	MAN2241-010L	7433

8698 7590 03/29/2017
 STANDLEY LAW GROUP LLP
 6300 Riverside Drive
 Dublin, OH 43017

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
 (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

William DUNN, Alpharetta, GA;
 Manufacturing Resources International, Inc., Alpharetta, GA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

U.S. Patent No: 9,629,187
Inventor: William Dunn
Issued: April 18, 2017
Application No.: 15/180,968
Examiner: Richard H. Kim
Group Art Unit: 2871
Confirmation No.: 7433
Title: SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED
LOOP COOLING SYSTEM AS THE CONVECTION PLATE
Docket No.: MAN2241-010L

CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. §1.8 (A)

Date of Transmission: April 26, 2017

I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office by EFS-Web.

/Trisha M. Beachy-Bryant/
Trisha M. Beachy-Bryant, Paralegal

Sir:

REQUEST FOR CERTIFICATE OF CORRECTION PURSUANT TO 37 C.F.R. 1.322

Transmitted herewith is a Certificate of Correction for the above-identified patent. Upon reviewing the patent, the patentee noted typographical errors made by the Patent Office in the printing of the priority claim on the title page of the patent, which should be corrected as indicated on the attached form PTO/SB/44. A review of the application as submitted and thereafter amended confirms that the errors were a result of Patent Office mistake and, therefore, no fee is due.

Approval of the Certificate of Correction is respectfully solicited.

Respectfully submitted,

Date: April 26, 2017

By: /Eric M. Gayan/
Eric M. Gayan
Registration No. 46,103
Standley Law Group LLP
6300 Riverside Drive
Dublin, Ohio 43017
Telephone: 614/792-5555
Facsimile: 614/792-5536

PTO/SB/44 (09-07)

Approved for use through 01/31/2020. OMB 0651-0033

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE CERTIFICATE OF CORRECTION

Page 1 of 1

PATENT NO. : 9,629,187

APPLICATION NO.: 15/180,968

ISSUE DATE : April 18, 2017

INVENTOR(S) : William Dunn

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the title page, please delete all of the text in Related U.S. Application Data sections (63) and (60), and insert -- Continuation of application No. 14/803,848 filed on Jul. 20, 2015, now Pat. No. 9,370,127, which is a continuation of application No. 14/508,767 filed on Oct. 7, 2014, now Pat. No. 9,089,079, which is a continuation of application No. 13/937,777 filed on Jul. 9, 2013, now Pat. No. 8,854,572, which is a continuation of application No. 13/605,530 filed on Sep. 6, 2012, now Pat. No. 8,482,695, which is a continuation of application No. 12/620,330 filed on Nov. 17, 2009, now Pat. No. 8,274,622, which is a non-provisional application of application No. 61/115,333 filed on Nov. 17, 2008. Application No. 12/620,330 is also continuation-in-part of application No. 12/411,925 filed on Mar. 26, 2009, now Pat. No. 8,854,595, which is a non-provisional application of application No. 61/039,454 filed on Mar. 26, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/556,029 filed on Sep. 9, 2009, now Pat. No. 8,373,841, which is a non-provisional application of application No. 61/095,615 filed on Sep. 9, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/234,307 filed on Sep. 19, 2008, now Pat. No. 8,767,165, which is a non-provisional application of application No. 61/033,064 filed on Mar. 3, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/234,360 filed on Sep. 19, 2008, which is a non-provisional application of application No. 61/053,713 filed on May 16, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/237,365, filed on Sep. 24, 2008, now Pat. No. 8,879,042, which is a non-provisional application of application No. 61/057,599 filed on May 30, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/235,200 filed on Sep. 22, 2008, which is a non-provisional application of application No. 61/076,126 filed on Jun. 26, 2008. --

MAILING ADDRESS OF SENDER (Please do not use Customer Number below):

Standley Law Group LLP
6300 Riverside Drive
Dublin, OH 43017

This collection of information is required by 37 CFR 1.322, 1.323, and 1.324. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1.0 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Attention Certificate of Corrections Branch, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MRI00320800

Electronic Acknowledgement Receipt

EFS ID:	29029699
Application Number:	15180968
International Application Number:	
Confirmation Number:	7433
Title of Invention:	System for Using Constricted Convection with Closed Loop Cooling System As the Convection Plate
First Named Inventor/Applicant Name:	William DUNN
Customer Number:	8698
Filer:	Eric Michael Gayan/Trisha Beachy-Bryant
Filer Authorized By:	Eric Michael Gayan
Attorney Docket Number:	MAN2241-010L
Receipt Date:	26-APR-2017
Filing Date:	13-JUN-2016
Time Stamp:	10:25:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Request for Certificate of Correction	RequestForCertificateOfCorrection_MAN2241-010L_4-26-17.pdf	132768 b0e39ce465f663e6794f4201bf2110ca65ac8c7a	no	2

Warnings:

Information:**Total Files Size (in bytes):**

132768

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 9,629,287 B2
APPLICATION NO. : 15/180968
DATED : April 18, 2017
INVENTOR(S) : William Dunn

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page

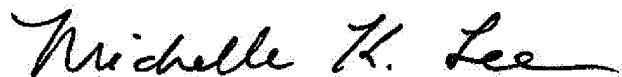
Item (63):

Please delete all of the text in Related U.S. Application Data items (63) and (60), and insert

-- Continuation of application No. 14/803,848 filed on Jul. 20, 2015, now Pat. No. 9,370,127, which is a continuation of application No. 14/508,767 filed on Oct. 7, 2014, now Pat. No. 9,089,079, which is a continuation of application No. 13/937,777 filed on Jul. 9, 2013, now Pat. No. 8,854,572, which is a continuation of application No. 13/605,530 filed on Sep. 6, 2012, now Pat. No. 8,482,695, which is a continuation of application No. 12/620,330 filed on Nov. 17, 2009, now Pat. No. 8,274,622, which is a non-provisional application of application No. 61/115,333 filed on Nov. 17, 2008. Application No. 12/620,330 is also continuation-in-part of application No. 12/411,925 filed on Mar. 26, 2009, now Pat. No. 8,854,595, which is a non-provisional application of application No. 61/039,454 filed on Mar. 26, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/556,029 filed on Sep. 9, 2009, now Pat. No. 8,373,841, which is a non-provisional application of application No. 61/095,615 filed on Sep. 9, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/234,307 filed on Sep. 19, 2008, now Pat. No. 8,767,165, which is a non-provisional application of application No. 61/033,064 filed on Mar. 3, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/234,360 filed on Sep. 19, 2008, which is a non-provisional application of application No. 61/053,713 filed on May 16, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/237,365, filed on Sep. 24, 2008, now Pat. No. 8,879,042, which is a non-provisional application of application No. 61/057,599 filed on May 30, 2008. Application No. 12/620,330 is also a continuation-in-part of application No. 12/235,200 filed on Sep. 22, 2008, which is a non-provisional application of application No. 61/076,126 filed on Jun. 26, 2008.

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Signed and Sealed this
Thirtieth Day of May, 2017



Michelle K. Lee
Director of the United States Patent and Trademark Office

EXHIBIT CCCC

7685951

THE UNITED STATES OF AMERICA

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July 11, 2018

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE
RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS
OF:

APPLICATION NUMBER: 61/053,713
FILING DATE: *May 16, 2008*



Certified by

Anders Iversen

Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

Doc Code: **TR.PROV**

Document Description: Provisional Cover Sheet (SB16)

PTO/SB/16 (04-07)

Approved for use through 06/30/2010 OMB 0651-0032

U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

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Provisional Application for Patent Cover Sheet

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c)

Inventor(s)

Inventor 1

Remove

Given Name

Middle Name

Family Name

City

State

Country ;

William

Dunn

Alpharetta

GA

US

All Inventors Must Be Listed – Additional Inventor Information blocks may be generated within this form by selecting the **Add** button.**Add****Title of Invention**

Isolated Gas Cooling System for Cooling Electrical Components of an Electronic Display

Attorney Docket Number (if applicable)

MAN2241-010C

Correspondence Address

Direct all correspondence to (select one):

☒ The address corresponding to Customer Number☐ Firm or Individual Name

Customer Number

08698

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.☐ Yes, the name of the U.S. Government agency and the Government contract number are:

Doc Code: **TR.PROV**

Document Description: Provisional Cover Sheet (SB16)

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Entity Status

Applicant claims small entity status under 37 CFR 1.27

- ☐ Yes, applicant qualifies for small entity status under 37 CFR 1.27
- ☒ No

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Signature

Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Mark R. Engle/			Date (YYYY-MM-DD)	May 16, 2008
First Name	Mark R.	Last Name	Engle	Registration Number (If appropriate)	58927

This collection of information is required by 37 CFR 1.51. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **This form can only be used when in conjunction with EFS-Web. If this form is mailed to the USPTO, it may cause delays in handling the provisional application.**

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7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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Isolated Gas Cooling System for Cooling Electrical Components of an Electronic Display

Inventor: William Dunn

Cross-Reference to Related Applications

[0001] This application is a provisional patent application and does not claim priority to any co-pending applications.

Technical Field

[0002] This invention generally relates to cooling systems and in particular to cooling systems for cooling the electrical components of electronic displays.

Background of the Art

[0003] Conductive and convective heat transfer systems for electronic displays are known. These systems of the past generally attempt to remove heat from the electronic components in a display through as many sidewalls of the display as possible. In order to do this, the systems of the past have relied primarily on fans for moving air past the components to be cooled and out of the display. In some cases, the heated air is moved into convectively thermal communication with fins. Some of the past systems also utilize conductive heat transfer from heat producing components directly to heat conductive housings for the electronics. In these cases, the housings have a large surface area, which is in convective communication with ambient air outside the housings. Thus, heat is transferred convectively or conductively to the housing and is then transferred into the ambient air from the housing by natural convection.

[0004] While such heat transfer systems have enjoyed a measure of success in the past, improvements to displays require even greater cooling capabilities.

Summary of the Invention

[0005] In particular, cooling devices for electronic displays of the past have generally used convective heat dissipation systems that function to cool an entire interior of the display by one or more fans and fins, for example. By itself, this is not adequate in many climates, especially when radiative heat transfer from the sun through a display window becomes a major factor. In many applications and locations 200 Watts or more of power through such a display window is common. Furthermore, the market is demanding larger screen sizes for displays. With increased electronic display screen size and corresponding display window size more heat will be generated and more heat will be transmitted into the displays.

[0006] In the past, many displays have functioned satisfactorily with ten or twelve inch screens. Now, many displays are in need of screens having sizes greater than or equal to twenty-four inches that may require improved cooling systems. For example, some outdoor applications call for forty-seven inch screens and above. With increased heat production with the larger screens and radiative heat transfer from the sun through the display window, heat dissipation systems of the past, which attempt to cool the entire interior of the display with fins and fans, are no longer adequate.

[0007] A large fluctuation in temperature is common in the devices of the past. Such temperature fluctuation adversely affects the electronic components in these devices. Whereas the systems of the past attempted to remove heat only through the non-

display sides and rear components of the enclosure surrounding the electronic display components, a preferred embodiment of the present invention causes convective heat transfer from the face of the display as well. By the aspects described below, the present invention has made consistent cooling possible for electronic displays having screens of sizes greater than or equal to twelve inches. For example, cooling of a 55 inch screen can be achieved, even in extremely hot climates. Greater cooling capabilities are provided by the device and method described and shown in more detail below.

[0008] An exemplary embodiment of the present invention relates to an isolated gas cooling system and a method for cooling the electronic components of an electronic display. An exemplary embodiment includes an isolated gas cooling chamber. The gas cooling chamber is preferably a closed loop which includes a first gas chamber comprising a transparent anterior plate and a second gas chamber comprising a cooling plenum. The first gas chamber is anterior to and coextensive with the viewable face of the electronic display surface. The transparent anterior plate may be set forward of the electronic display surface by spacers defining the depth of the first gas chamber. A cooling chamber fan, or equivalent means, may be located within the cooling plenum. The fan may be used to propel gas around the isolated gas cooling chamber loop. As the gas traverses the first gas chamber it contacts the electronic display surface, absorbing heat from the surface of the display. Because the gas and the relevant surfaces of the first gas chamber are transparent, the image quality remains excellent. After the gas has traversed the transparent first gas chamber, the gas may be directed into the rear cooling plenum. Located within the rear cooling plenum can be any

number of electronic components which may be used to run the display. These components may include but are not limited to: transformers, circuit boards, resistors, capacitors, batteries, power transformers, motors, illumination devices, wiring and wiring harnesses, and switches.

[0009] In order to cool the gas in the plenum, external convective or conductive means may be employed. In at least one embodiment, an external fan unit may be utilized to blow cooler, ambient air over the exterior surfaces of the plenum. The heat from the warm gas may radiate into the walls of the plenum and then escape the walls of the plenum by convection or conduction or a combination of both. The external fan unit may be positioned at the base of the housing for the entire display. Once the air is heated by flowing over the exterior surfaces of the plenum, the heated air may exit the housing as exhaust. Note, that the air from this external fan should not enter the isolated cooling system as this would introduce dust and contaminates into the otherwise clean air.

[0010] The foregoing and other features and advantages of the present invention will be apparent from the following more detailed description of the particular embodiments of the invention, as illustrated in the accompanying drawings.

Brief Description of the Drawings

[0011] A better understanding of an exemplary embodiment will be obtained from a reading of the following detailed description and the accompanying drawings wherein identical reference characters refer to identical parts and in which:

[0012] FIGURE 1 is a perspective view of an exemplary embodiment in conjunction with an exemplary electronic display.

[0013] FIGURE 2 is an exploded perspective view of an exemplary embodiment showing components of the isolated gas cooling system.

[0014] FIGURE 3 is top plan view of an exemplary embodiment of the cooling chamber.

[0015] FIGURE 4 is a front perspective view of an embodiment of the isolated cooling chamber, particularly the transparent anterior surface of first gas chamber.

[0016] FIGURE 5 is a rear perspective view of an embodiment of the isolated cooling chamber, particularly the cooling plenum.

[0017] FIGURE 6 is a rear perspective view of an embodiment of the isolated cooling chamber showing surface features that may be included on the plenum

[0018] FIGURE 7 is a top plan view of an exemplary embodiment of the cooling chamber showing surface features that may be included on the plenum.

[0019] FIGURE 8 is a front perspective view of an embodiment of the isolated cooling chamber with included thermoelectric modules.

[0020] FIGURE 9 is a top plan view of an exemplary embodiment of the cooling chamber with included thermoelectric modules.

[0021] FIGURE 10 is an exploded perspective view of an exemplary embodiment showing components of the isolated gas cooling system.

Detailed Description

[0022] Embodiments of the present invention relate to a cooling system for the electronic components of an electronic display and to combinations of the cooling system and the electronic display. Exemplary embodiments of the present invention provide an isolated gas cooling system for an electronic display. Such an isolated gas cooling system is the subject matter of co-pending U.S. Application No. 61/033,064, incorporated by reference herein.

[0023] Fig. 1 is an exemplary embodiment of the present invention. As may be appreciated, when the display 10 is exposed to outdoor elements, the temperatures inside the display 10 will vary greatly without some kind of cooling device. As such, the electronics including the display screen (e.g., LCD screen) will have a greatly reduced life span. By implementing certain embodiments of the cooling system disclosed herein, temperature fluctuation is greatly reduced. This cooling capability has been achieved in spite of the fact that larger screens generate more heat than smaller screens.

[0024] The display shown is equipped with an innovative gas cooling system. Accordingly, it may be placed in direct sunlight. Although the cooling system may be used on smaller displays, it is especially useful for larger LCD, LED, or organic light emitting diodes (OLED) displays. These screens, especially with displays over 24 inches, face significant thermoregulatory issues in outdoor environments.

[0025] In Fig. 1, the display area of the electronic display shown includes a narrow gas chamber that is anterior to and coextensive with the electronic display surface. The display shown also is equipped with an optional air curtain device 114 which is the subject matter of co-pending U.S. Application No. 11/941,728, incorporated by reference herein. Optionally, the display also has a reflection shield 119, to mitigate

reflection of the sunlight on the display surface. Additionally, in outdoor environments, housing 70 is preferably a color which reflects sunlight.

[0026] It is to be understood that the spirit and scope of the disclosed embodiments includes cooling of displays including, but not limited to LCDs. By way of example and not by way of limitation, the present invention may be used in conjunction with displays selected from among LCD (including TFT or STN type), light emitting diode (LED), organic light emitting diode (OLED), field emitting display (FED), cathode ray tube (CRT), and plasma displays. Furthermore, embodiments of the present invention may be used with displays of other types including those not yet discovered. In particular, it is contemplated that the present invention may be well suited for use with full color, flat panel OLED displays. While the embodiments described herein are well suited for outdoor environments, they may also be appropriate for indoor applications (e.g., factory environments) where thermal stability of the display may be at risk.

[0027] As shown in Fig. 2 an exemplary embodiment 10 of the electronic display and gas cooling system includes an isolated gas cooling chamber 20 contained within an electronic display housing 70. A narrow transparent first gas chamber is defined by spacers 100 and transparent front plate 90. A second transparent front plate 130 may be laminated to front plate 90 to help prevent breakage of front glass 90. As shown in Fig. 2, cooling chamber 20 may surround LCD stack 80 and associated backlight panel 140.

[0028] The gas cooling system 10 shown in Fig. 2 may include means for cooling gas contained within the second gas chamber. These means may include a fan 60 which may be positioned at the base of the display housing 70. The fan will force the cooler

ingested air over the exterior surfaces of a posterior cooling plenum 45. If desired, an air conditioner (not shown) may also be utilized to cool the air which contacts the external surfaces of plenum 45.

[0029] Referring to Fig. 3, in at least one embodiment the isolated gas cooling chamber 20 comprises a closed loop which includes a first gas chamber 30 (see Fig. 3) and a second gas chamber 40. The first gas chamber includes a transparent plate 90. The second gas chamber comprises a cooling plenum 45. The term “isolated gas” refers to the fact that the gas within the isolated gas cooling chamber 20 is essentially isolated from external air in the housing of the display. Because the first gas chamber 30 is positioned in front of the display image, the gas should be substantially free of dust or other contaminants that might negatively affect the display image.

[0030] Various electronic components 200 are shown in various positions throughout the plenum 45. Placing these components 200 within the plenum allows for increased air flow around the components 200 and increased cooling. Further, location of the components 200 within the plenum 45 can help satisfy space considerations, as well as manufacturing and repair considerations. These components 200 may be mounted directly on the walls or surfaces of the plenum 45, or may be suspended by rods or posts 210. The precise mounting of the components 200 can vary depending on the amount of cooling that is required for the component, manufacturing limitations, wire routing benefits, or ease of repair or replacement of the specific component. Further, the precise wiring of the components 200 can vary depending on similar factors. The wiring may pass through a single hole in the plenum 45 and then spread to each component or there may be various holes in the plenum 45 to accommodate the wiring

for each component individually. In a further embodiment, PCB boards and other typical electronic mounting surfaces may be integrated into the plenum 45 such that the mounting board itself substitutes as a portion of the plenum wall.

[0031] The isolated gas may be almost any transparent gas, for example, normal air, nitrogen, helium, or any other transparent gas. The gas is preferably colorless so as not to affect the image quality. Furthermore, the isolated gas cooling chamber need not necessarily be hermetically sealed from the external air. It is sufficient that the gas in the chamber is isolated to the extent that dust and contaminants may not substantially enter the first gas chamber.

[0032] In the closed loop configuration shown in Fig. 3, the first gas chamber 30 is in gaseous communication with the second gas chamber 40. A cooling chamber fan 50 may be provided within the posterior plenum 45. The cooling fan 50 may be utilized to propel gas around the isolated gas cooling chamber 20. The first gas chamber 30 includes at least one front glass 90 mounted in front of an electronic display surface 85. The front glass 90 may be set forward from the electronic display surface 85 by spacers 100 (see Fig. 4). The spacing members 100 define the depth of the narrow channel passing in front of the electronic display surface 85. The spacing members 100 may be independent or alternatively may be integral with some other component of the device (e.g., integral with the front plate). The electronic display surface 85, the spacing members, and the transparent front plate 90 define a narrow first gas chamber 30. The chamber 30 is in gaseous communication with plenum 45 through entrance opening 110 and exit opening 120.

[0033] As shown in Fig. 3, a posterior surface of the first gas chamber 30 preferably comprises the electronic display surface 85 of the display stack 80. As the isolated gas in the first gas chamber 30 traverses the display it contacts the electronic display surface 85. Contacting the cooling gas directly to the electronic display surface 85 enhances the convective heat transfer away from the electronic display surface 85.

[0034] Advantageously, in exemplary embodiments the electronic display surface 85 comprises the posterior surface of the first gas chamber 30. Accordingly, the term “electronic display surface” refers to the front surface of a typical electronic display (in the absence of the embodiments disclosed herein). The term “viewable surface” or “viewing surface” refers to that portion of the electronic display surface from which the electronic display images may be viewed by the user.

[0035] The electronic display surface 85 of typical displays is glass. However, neither display surface 85, nor transparent front plate 90, nor optional second transparent front plate 130 need necessarily be glass. Therefore, the term “glass” will be used herein interchangeably with the term plate. By utilizing the electronic display surface 85 as the posterior surface wall of the gas compartment 30, there may be fewer surfaces to impact the visible light traveling through the display. Furthermore, the device will be lighter and cheaper to manufacturer.

[0036] Although the embodiment shown utilizes the electronic display surface 85, certain modifications and/or coatings (e.g., anti-reflective coatings) may be added to the electronic display surface 85, or to other components of the system in order to accommodate the coolant gas or to improve the optical performance of the device. In the embodiment shown, the electronic display surface 85 may be the front glass

plate of a liquid crystal display (LCD) stack. However, almost any display surface may be suitable for embodiments of the present cooling system. Although not required, it is preferable to allow the cooling gas in the first gas chamber 30 to contact the electronic display surface 85 directly. In this way, the convective effect of the circulating gas will be maximized. Preferably the gas, which has absorbed heat from the electronic display surface 85 may then be diverted to the cooling plenum 45 where the collected heat energy in the gas may be dissipated into the air within the display housing 70 by conductive and or convective means.

[0037] To prevent breakage, the optional second surface glass 130 may be adhered to the front surface of glass 90. Alternatively surface glass 90 may be heat tempered to improve its strength. As shown in Fig. 3, fan 50 propels a current of air around the loop (see arrows) of the isolated gas cooling chamber 20. The plenum 45 defining the second gas chamber 40 is adapted to circulate the gas behind the electronic display surface 85. The plenum 45 preferably surrounds most of the heat generating components of the electronic display, for example, backlight panel 140 (e.g., an LED backlight).

[0038] Fig. 4 shows that the anterior surface 90 of the first gas chamber 30 is transparent and is positioned anterior to and at least coextensive with a viewable area of an electronic display surface 85. The arrows shown represent the movement of the isolated gas through the first gas chamber 30. As shown, the isolated gas traverses the first gas chamber 30 in a horizontal direction. Although cooling system 20 may be designed to move the gas in either a horizontal or a vertical direction, it is preferable to propel the gas in a horizontal direction. In this way, if dust or contaminants do enter the

first gas chamber 30, they will tend to fall to the bottom of chamber 30 outside of the viewable area of the display. The system may move air left to right, or alternatively, right to left.

[0039] As is clear from Fig. 4, to maximize the cooling capability of the system, the first gas chamber 30 preferably covers the entire viewable surface of the electronic display surface 85. Because the relevant surfaces of the first gas chamber 30 as well as the gas contained therein are transparent, the image quality of the display remains excellent. Anti-reflective coatings may be utilized to minimize specular and diffuse reflectance. After the gas traverses the first gas chamber 30 it exits through exit opening 120. Exit opening 120 defines the entrance junction into the rear cooling plenum 45.

[0040] Fig. 5 shows a schematic of the rear cooling plenum 45 (illustrated as transparent for explanation). One or more fans 50 within the plenum may provide the force necessary to move the isolated gas through the isolated gas cooling chamber. Various electronic components 200 can be located anywhere throughout the second gas chamber 40. Again, these components can be mounted directly on the walls of the chamber or supported on rods or posts 210. Thus, the cooling plenum 45 can be designed to not only take heat from the first gas chamber 30 but also to take heat from these various electronic components 200. Plenum 45 may have various contours and features to accommodate the internal structures within a given electronic display application.

[0041] As can be discerned in Figs. 6 and 7, various surface features 150 may be added to improve heat dissipation from the plenum 45. These surface features 150

provide more surface area to radiate heat away from the gas within the second gas chamber 40. These features 150 may be positioned at numerous locations on the surfaces of the plenum 45. These features may be used to further facilitate the cooling of various electronic components 200 which may also be located within the plenum 45.

[0042] Referring to Figs. 8 and 9, one or more thermoelectric modules 160 may be positioned on at least one surface of the plenum 45 to further cool the gas contained in the second gas chamber 40. The thermoelectric modules 160 may be used independently or in conjunction with surface features 150. Alternatively, thermoelectric modules 160 may be useful to heat the gas in the rear plenum if the unit is operated in extreme cold conditions. Thermoelectric modules 160 may also be used to further facilitate the cooling or heating of various electronic components 200 which may also be located within the plenum 45.

[0043] Fig. 10 shows an exemplary method for removing heat in the gas contained in the rear plenum 45. Fan 60 may be positioned to ingest external air and blow that air into the display housing 70. Preferably, the air will contact the anterior and posterior surfaces of the plenum 45. Furthermore, in this configuration, fan 60 will also force fresh air past the heat generating components of the electronic display (e.g., the TFT layer, backlight, transformers, circuit boards, resistors, capacitors, batteries, power transformers, motors, illumination devices, wiring and wiring harnesses, and switches) to further improve the cooling capability of the cooling system. The heated exhaust air may exit through one or more apertures 179 located on the display housing 70. In a preferred embodiment, the air from this external fan 60 should not enter the isolated

cooling system as this would introduce dust and contaminates into the otherwise clean gas.

[0044] Besides thermoelectric modules 160, there are a number of ways to cool the gas in the second gas chamber. For example air conditioners or other cooling means known by those skilled in the art may be useful for cooling the gas contained in plenum 45.

[0045] While the display is operational, the isolated gas cooling system may run continuously. However, if desired, a temperature sensor (not shown) and a switch (not shown) may be incorporated within the electronic display 10. The thermostat may be used to detect when temperatures have reached a predetermined threshold value. In such a case, the isolated gas cooling system may be selectively engaged when the temperature in the display reaches a predetermined value. Predetermined thresholds may be selected and the system may be configured with a thermostat (not shown) to advantageously keep the display within an acceptable temperature range.

[0046] An optional air filter (not shown) may be employed within the plenum to assist in preventing contaminates and dust from entering the first gas chamber 30.

[0047] Having shown and described a preferred embodiment of the invention, those skilled in the art will realize that many variations and modifications may be made to affect the described invention and still be within the scope of the claimed invention. Additionally, many of the elements indicated above may be altered or replaced by different elements which will provide the same result and fall within the spirit of the claimed invention. It is the intention, therefore, to limit the invention only as indicated by the scope of the claims.

CLAIMS

1. A gas cooling system for an electronic display with a display surface and viewable area, the system comprising:

a first gas chamber positioned anterior to and at least coextensive with the viewable area of said electronic display surface;

a second gas chamber positioned posterior to the viewable area of said display device and operatively connected to said first gas chamber so that gas may circulate through said first and second chambers, said second chamber comprising

a fan to propel gas through said first and second chambers; and

one or more electronic components;

a means for cooling gas contained within the second gas chamber.

2. The gas cooling system of claim 1, wherein:

said first gas chamber comprises

a transparent anterior plate;

a transparent posterior plate aligned with said anterior plate;

spacers which separate said plates and enclose the first chamber;

an entrance opening; and

an exit opening.

3. The air cooling system of claim 2, wherein said second chamber shares said entrance and exit opening of said first gas chamber and further comprises top, bottom, anterior, and posterior surfaces which enclose said chamber.
4. The air cooling system of claim 3, wherein:
said one or more electronic components are mounted on the surfaces of said second chamber.
5. The air cooling system of claim 3, wherein:
said one or more electronic components are mounted on posts which suspend said component from the surfaces of said second chamber.
6. The system of claim 1, wherein said one or more electronic components comprise any one of the following: transformers, circuit boards, resistors, capacitors, batteries, power transformers, motors, illumination devices, wiring and wiring harnesses, and switches.

7. The system of claim 1, wherein said fan runs continuously when the electronic display is operating.

8. The system of claim 1, further comprising:

a thermostat;

a switch; and

wherein said fan remains off unless switched on when the thermostat detects a threshold temperature.

9. The system of claim 1, wherein said means for cooling said gas comprises surface features on said second chamber.

10. The system of claim 1, wherein said means for cooling said gas comprises a thermoelectric module.

11. The system of claim 1, wherein the second gas chamber includes a filter.

12. The system of claim 3, wherein said means for cooling gas comprises:

a fan near the base of the display housing to force gas over an external surface of the second chamber; and

an exhaust aperture in the display housing adapted to allow the heated gas to exit the chamber.

13. The system of claim 1 wherein the system further comprises:

an air curtain device to direct gas across the external surface of the anterior plate of the first chamber.

14. A gas cooling system for an electronic display with a viewable area, the system comprising:

- a first gas chamber positioned anterior to and at least coextensive with the viewable area of said electronic display surface;

- wherein said first chamber comprises

- a transparent anterior plate;

- a transparent posterior plate aligned with said anterior plate;

- top and bottom spacers which separate said plates and enclose the first chamber;

- an entrance opening; and

- an exit opening.

- a second gas chamber positioned posterior to the viewable area of said display device and operatively connected to said entrance and exit openings of said first gas chamber so that gas may circulate continuously through said first and second chambers, said second chamber comprising

- a fan to propel gas through said first and second chambers;

- one or more electronic components; and

- a means for cooling gas contained within the second gas chamber.

15. The gas cooling system of claim 14 wherein said one or more electronic components are any one of the following: transformers, circuit boards, resistors, capacitors, batteries, power transformers, motors, illumination devices, wiring and wiring harnesses, and switches

16. The gas cooling system of claim 14 wherein the cooling means comprises any one of the following:

surface features on said second chamber;

a fan near the base of the display housing to force gas over an external surface of the second chamber and an exhaust aperture in the display housing adapted to allow the heated gas to exit the chamber;

an air conditioner device operatively connected to said second chamber; and

one or more thermoelectric modules.

17. A method for cooling an electronic display with isolated gas, comprising:

providing an anterior first chamber which is operatively connected to a posterior second chamber such that gas may circulate through each chamber and where each chamber has an entrance and exit;

forcing gas into the exit of the second chamber and into the entrance of the first chamber;

contacting the gas with a surface in the first chamber;

directing the gas through the exit of the first chamber and into the entrance of the second chamber;

directing the gas over various electronic components;

cooling the gas in the second chamber;

re-introducing the cooled gas into the exit of the second chamber.

18. The method of claim 17, wherein the cooling step comprises the steps of:

contacting the gas with one or more interior surfaces in the second chamber;

transferring heat from the gas to said one or more interior surfaces;

transferring heat from said interior surface to an exterior surface of the second chamber;

contacting air with an external surface of the second chamber;

transferring heat from the external surface to the air; and

removing the warmed air from the display housing through one or more exhaust ports.

19. The method of claim 18, wherein the cooling step comprises the steps of:

contacting the gas with one or more interior surfaces in the second chamber;

transferring heat from the gas to said one or more interior surfaces;

transferring heat from said interior surface to an exterior surface and exterior surface features of the second chamber;

contacting air with an exterior surface and exterior surface features on the second chamber;

transferring heat from the exterior surface and exterior surface features to the air; and

removing the warmed air from the display housing through one or more exhaust ports.

20. The method of claim 17, further comprising the steps of:

providing an air curtain device which is connected to the first chamber; and

directing gas along the exterior of the first chamber.

ABSTRACT

[0048] A preferred embodiment of the present invention relates to a cooling system and a method for cooling an electronic display and its electronic components. A preferred embodiment includes a transparent gas cooling chamber. The electronic components which operate the system are preferably housed both within the electronic display housing and within the cooling chamber. The cooling chamber defines a gas compartment that is anterior and posterior to the electronic display surface. Fans may be used to propel the isolated gas through the cooling chamber. The circulating gas removes heat directly from the electronic display surface as well as the electronic components which operate the display. The isolated gas is transparent or at least semi-transparent. The image quality of an exemplary embodiment remains essentially unchanged, even though the gas is flowing through a narrow channel over the visible face of the electronic display surface.

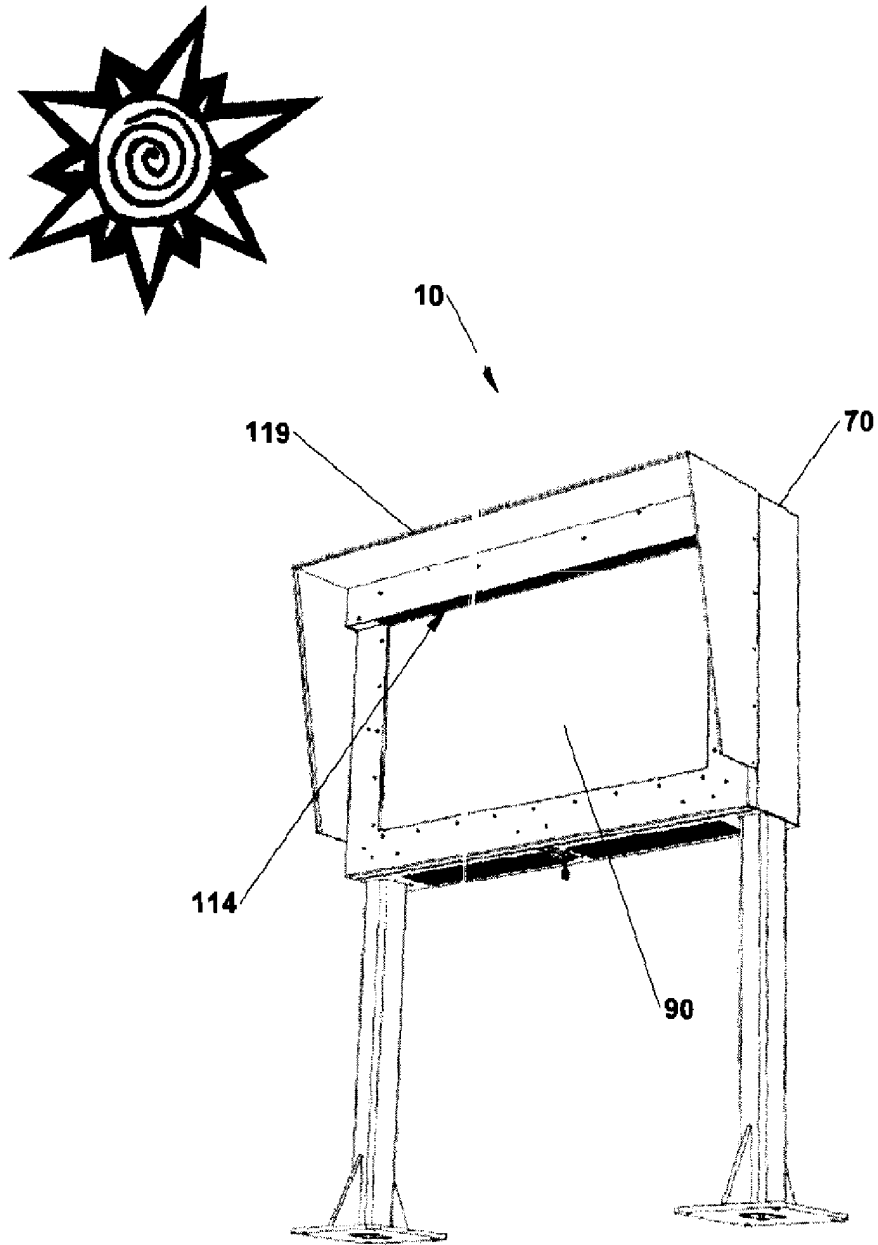


Fig. 1

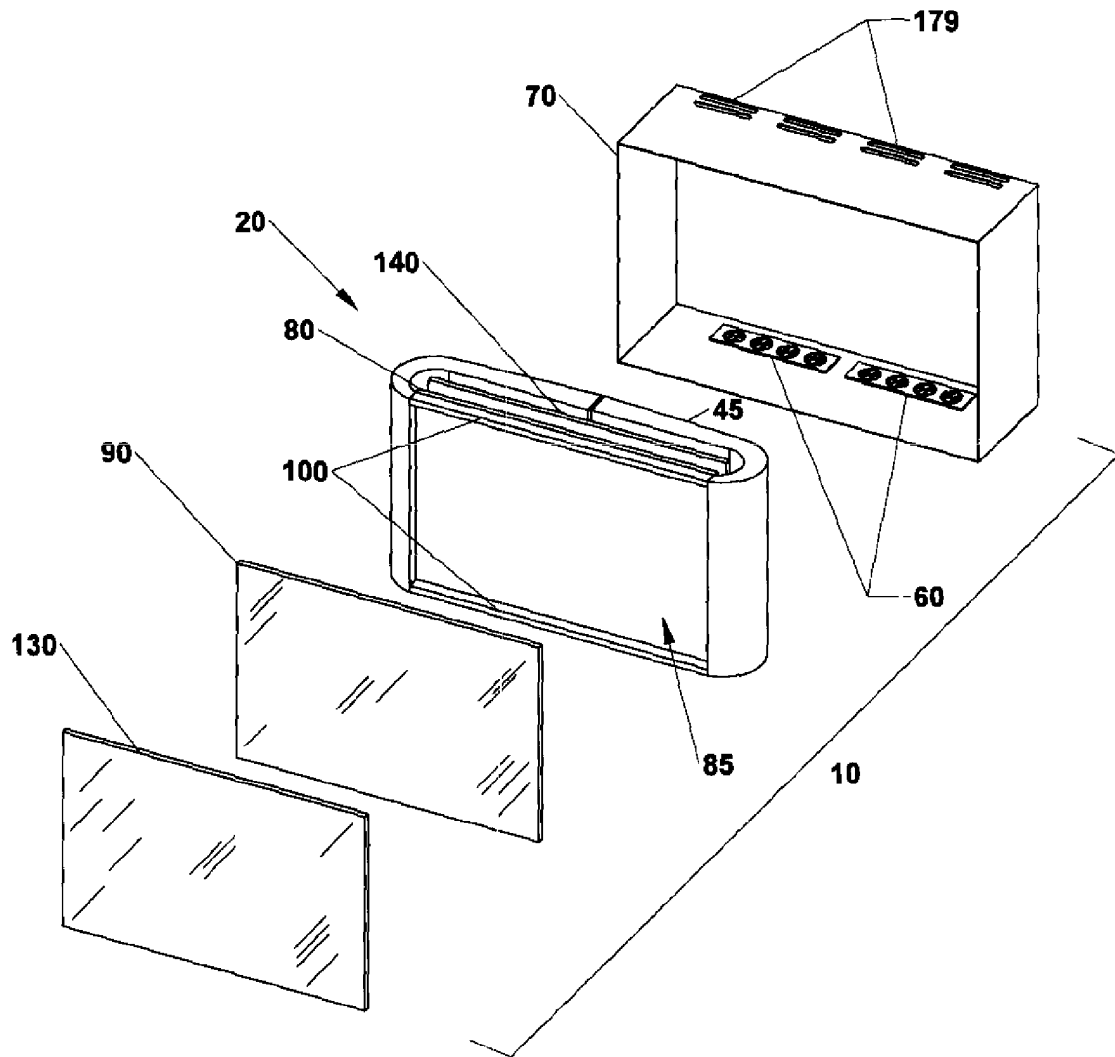


Fig. 2

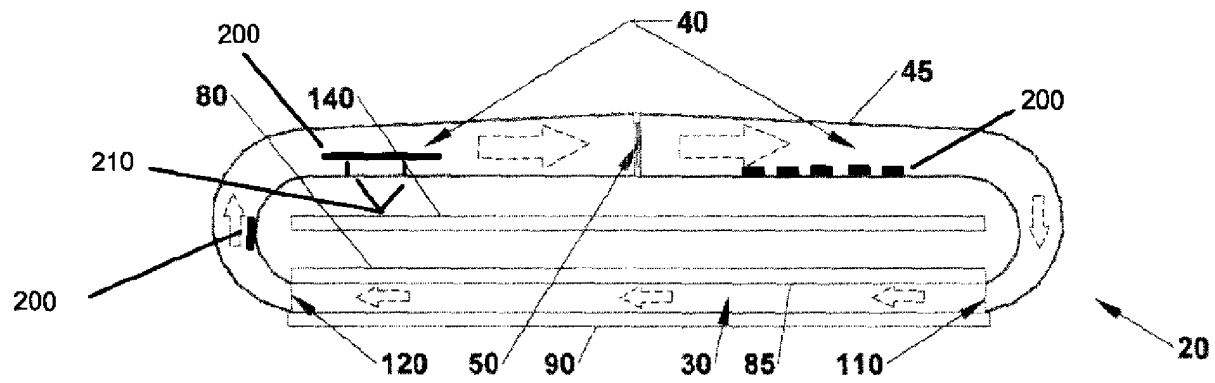


Fig. 3

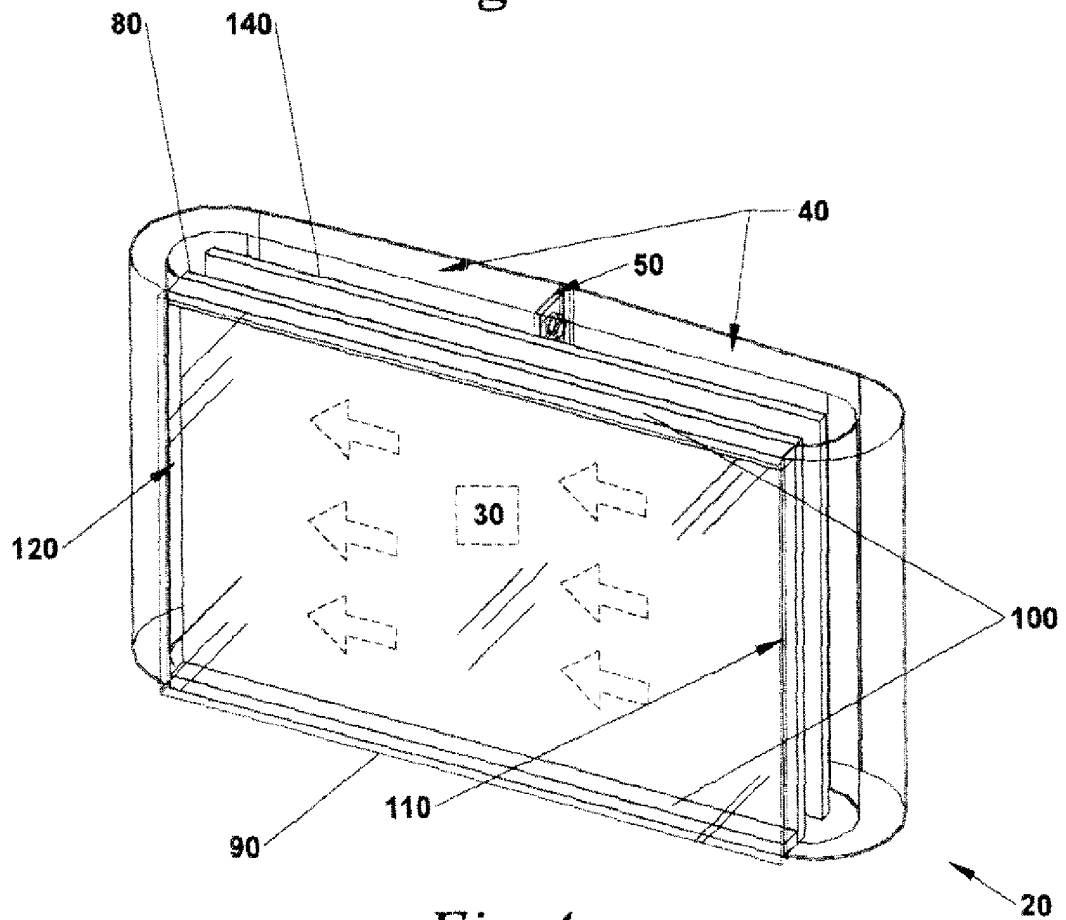


Fig. 4

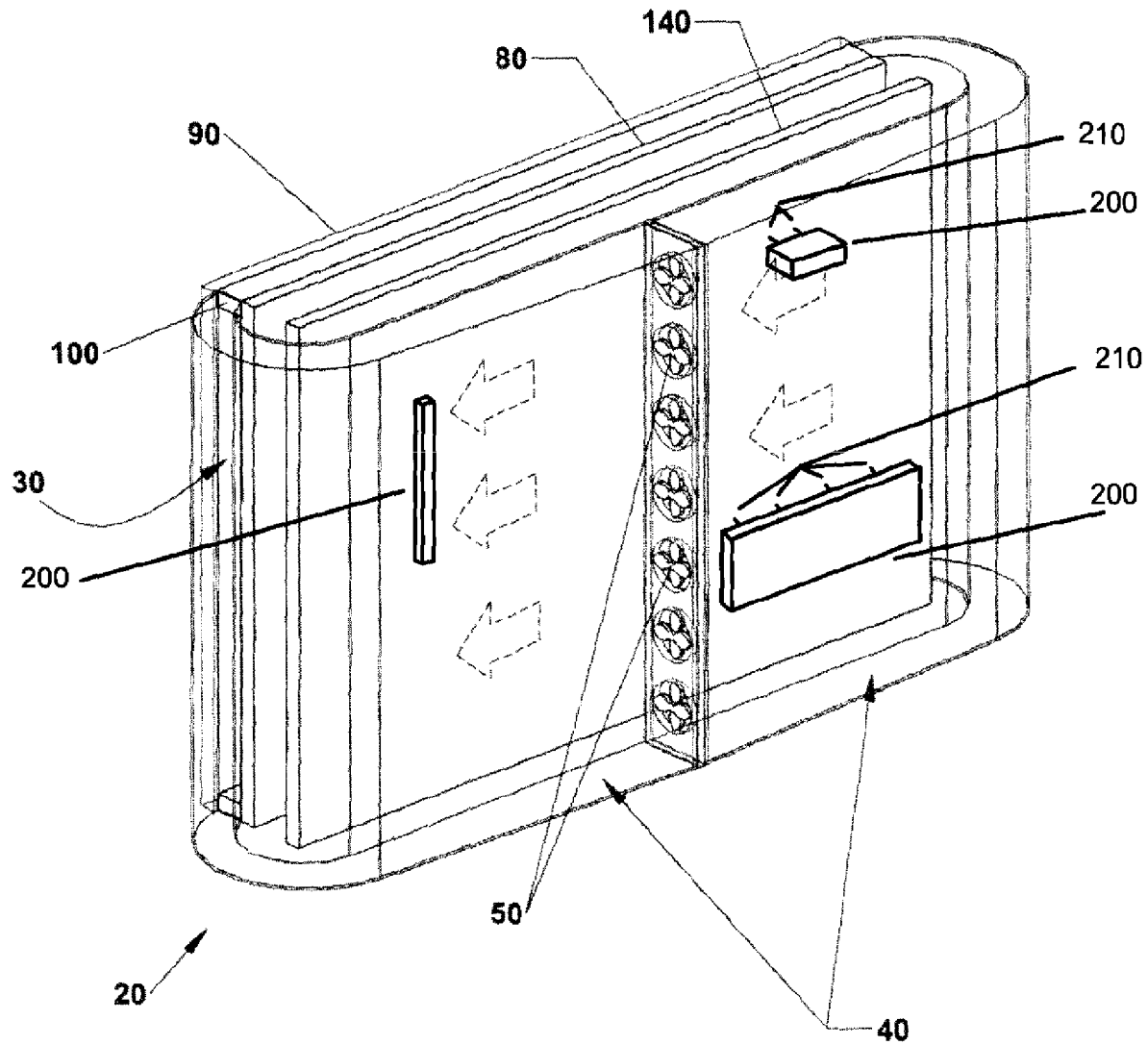


Fig.5

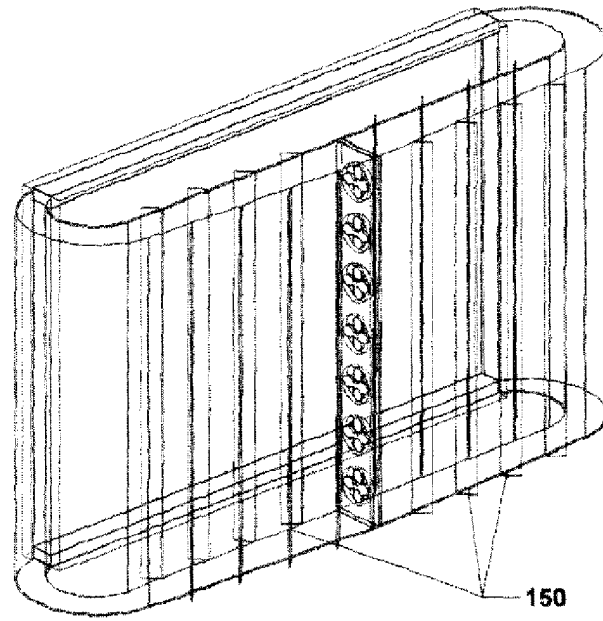


Fig. 6

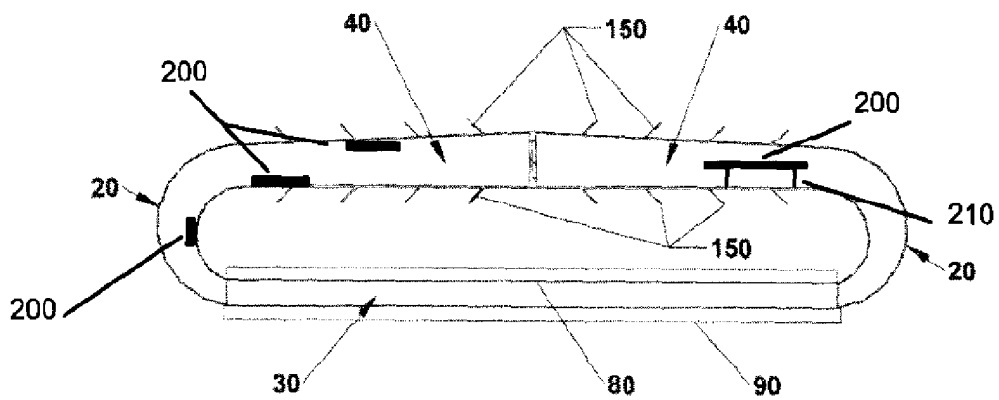


Fig. 7

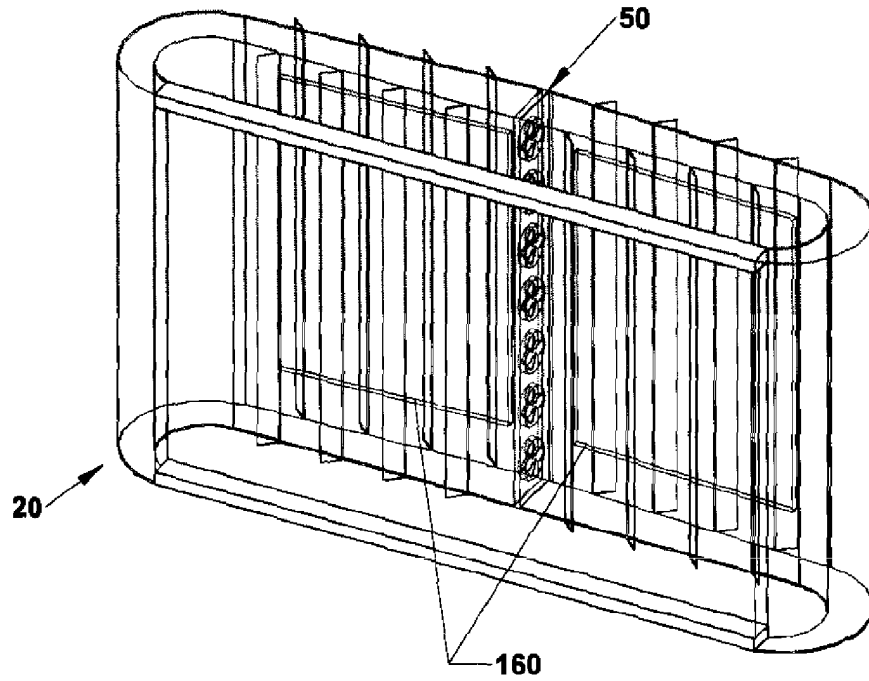


Fig. 8

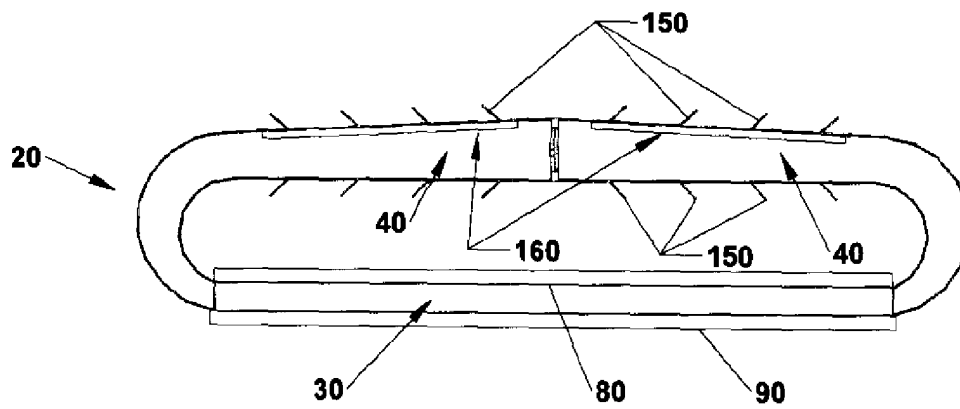


Fig. 9

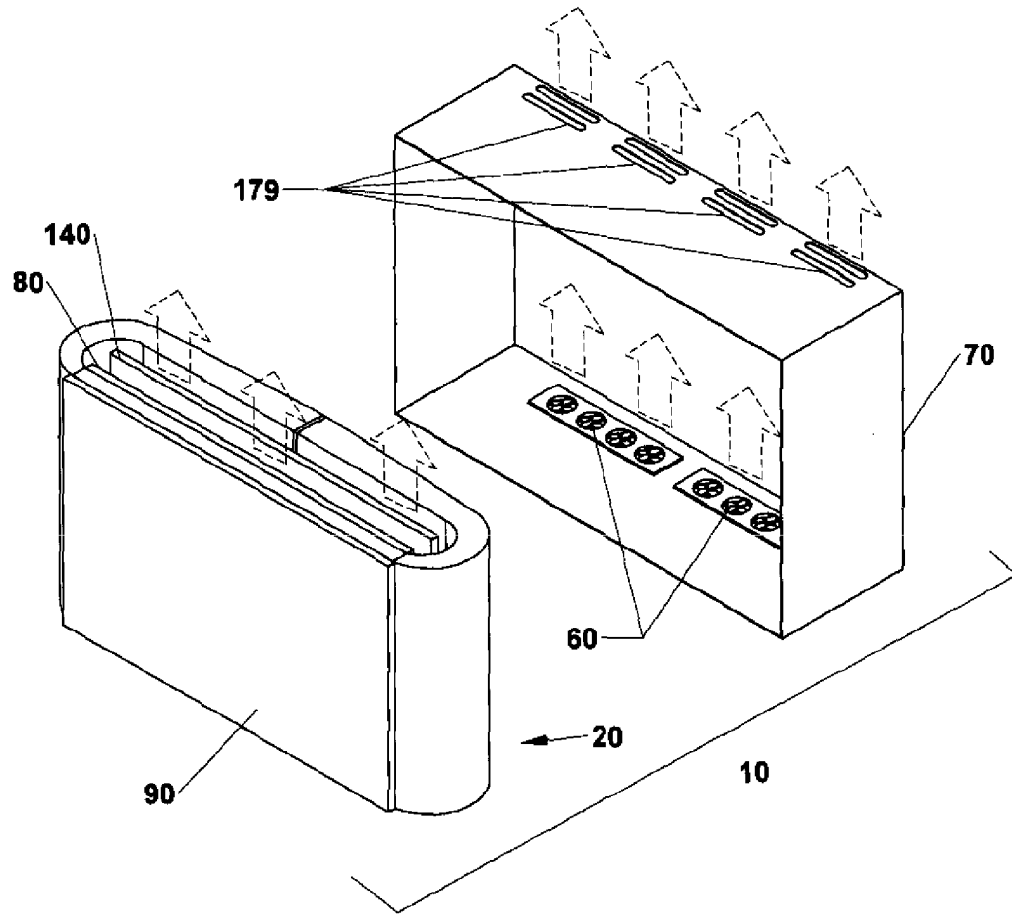


Fig. 10

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		Isolated Gas Cooling System for Cooling Electrical Components of an Electronic Display		
First Named Inventor/Applicant Name:		William DUNN		
Filer:		Mark Ryan Engle/Emily Shultz		
Attorney Docket Number:		MAN2241-010C		
Filed as Large Entity				
Provisional Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Provisional application filing	1005	1	210	210
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				210

Electronic Acknowledgement Receipt

EFS ID:	3313685
Application Number:	61053713
International Application Number:	
Confirmation Number:	7729
Title of Invention:	Isolated Gas Cooling System for Cooling Electrical Components of an Electronic Display
First Named Inventor/Applicant Name:	William DUNN
Customer Number:	08698
Filer:	Mark Ryan Engle/Emily Shultz
Filer Authorized By:	Mark Ryan Engle
Attorney Docket Number:	MAN2241-010C
Receipt Date:	16-MAY-2008
Filing Date:	
Time Stamp:	11:45:02
Application Type:	Provisional

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RAM confirmation Number	6542
Deposit Account	194076
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Provisional Cover Sheet (SB16)	ProvisionalSB.pdf	1000989	no	3
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Information:					
2		Provisional_Application.pdf	80128	yes	23
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	Document Description		Start	End	
	Specification		1	14	
	Claims		15	22	
	Abstract		23	23	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	Figures.pdf	154811	no	7
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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
61/053,713	05/16/2008		210	MAN2241-010C		

CONFIRMATION NO. 7729

FILING RECEIPT



OC000000030128232

8698
 STANDLEY LAW GROUP LLP
 495 METRO PLACE SOUTH
 SUITE 210
 DUBLIN, OH 43017

Date Mailed: 05/28/2008

Receipt is acknowledged of this provisional patent application. It will not be examined for patentability and will become abandoned not later than twelve months after its filing date. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

William Dunn, Alpharetta, GA;

Power of Attorney:

Mark Engle--58927

If Required, Foreign Filing License Granted: 05/23/2008

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 61/053,713**

Projected Publication Date: None, application is not eligible for pre-grant publication

Non-Publication Request: No

Early Publication Request: No

Title

Isolated Gas Cooling System for Cooling Electrical Components of an Electronic Display

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MRI LCD Display Patents

App. No.	Title	App Date	Grant Date	Patent No.	Country
12/787,152	A METHOD FOR DRIVING A COOLING FAN WITHIN AN ELECTRONIC DISPLAY	05/25/2010	04/15/2014	8,700,226	United States
12/266,749	ADVERTISING DISPLAYS	11/07/2008	09/13/2011	8,016,452	United States

MRI00013423

App. No.	Title	App Date	Grant Date	Patent No.	Country
13/858,426	APPARATUS AND METHOD FOR ASSEMBLING LARGE ELECTRONIC DISPLAYS	04/08/2013	04/19/2016	9,317,060	United States
12/124,741	BACKLIGHT ADJUSTMENT SYSTEM	05/21/2008	02/28/2012	8,125,163	United States
13/353,371	BACKLIGHT ADJUSTMENT SYSTEM	01/19/2012	09/09/2014	8,829,815	United States
14/447,164	BACKLIGHT ADJUSTMENT SYSTEM	07/30/2014	05/12/2015	9,030,129	United States
14/709,045	BACKLIGHT ADJUSTMENT SYSTEM	05/11/2015	10/20/2015	9,167,655	United States
12/693,148	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME	01/25/2010	01/08/2013	8,351,013	United States
13/678,226	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME	11/15/2012	02/11/2014	8,648,993	United States
12/411,925	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	03/26/2009	10/07/2014	8,854,595	United States
14/508,621	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	10/07/2014	10/27/2015	9,173,322	United States
14/740,865	COOLING SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,500,896	United States
12/556,209	COOLING SYSTEM FOR OUTDOOR ELECTRONIC DISPLAYS	09/09/2009	02/19/2013	8,379,182	United States

MRI00013424

App. No.	Title	App Date	Grant Date	Patent No.	Country
12/330,041	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE	12/08/2008	05/29/2012	8,189,134	United States
12/793,474	DYNAMIC DIMMING LED BACKLIGHT	06/03/2010	01/08/2013	8,350,799	United States
13/722,537	DYNAMIC DIMMING LED BACKLIGHT	12/20/2012	04/22/2014	8,704,752	United States
13/850,854	DYNAMIC DIMMING LED BACKLIGHT	03/26/2013	08/12/2014	8,803,790	United States
12/905,704	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	10/15/2010	07/08/2014	8,773,633	United States
14/326,053	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	07/08/2014	03/15/2016	9,285,108	United States
13/644,743	FIELD SERVICABLE ELECTRONIC DISPLAY	10/04/2012	06/30/2015	9,072,166	United States
14/754,120	FIELD SERVICABLE ELECTRONIC DISPLAY	06/29/2015	04/12/2016	9,313,447	United States
12/618,104	FIELD SERVICEABLE ELECTRONIC DISPLAY	11/13/2009	11/13/2012	8,310,824	United States
14/326,059	FIGURE EIGHT CLOSED LOOP COOLING SYSTEM FOR ELECTRONIC DISPLAY	07/08/2014	10/18/2016	9,470,924	United States
12/125,046	FRAME SEAL METHODS FOR LCD	05/21/2008	10/22/2013	8,562,770	United States

MRI00013425

App. No.	Title	App Date	Grant Date	Patent No.	Country
29/322,897	GAS STATION TELEVISION	08/14/2008	07/07/2009	D595,678	United States
12/641,468	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	12/18/2009	02/18/2014	8,654,302	United States
14/050,464	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	10/10/2013	08/25/2015	9,119,325	United States
12/753,298	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	04/02/2010	01/08/2013	8,351,014	United States
13/692,657	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	12/03/2012	05/12/2015	9,030,641	United States
14/702,443	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	05/01/2015	10/27/2015	9,173,325	United States
12/833,514	ISOLATED ACCESS ASSEMBLY FOR BACK-TO-BACK ELECTRONIC DISPLAY AND STATIC DISPLAY	07/09/2010	04/16/2013	8,418,387	United States
12/237,365	ISOLATED COOLING SYSTEM HAVING AN INSULATOR GAP AND FRONT POLARIZER	09/24/2008	11/04/2014	8,879,042	United States
12/234,307	ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	09/19/2008	07/01/2014	8,767,165	United States
14/740,746	LED ASSEMBLY FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,500,801	United States
13/650,951	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	10/12/2012	03/24/2015	8,988,635	United States

MRI00013426

App. No.	Title	App Date	Grant Date	Patent No.	Country
14/230,765	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	03/31/2014	12/13/2016	9,519,185	United States
12/209,841	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly	09/12/2008	09/17/2013	8,537,302	United States
12/915,718	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT	10/29/2010	06/24/2014	8,760,613	United States
13/045,272	MODULAR SYSTEM FOR CONTROLLING A LIQUID CRYSTAL DISPLAY	03/10/2011	02/21/2017	9,578,273	United States
12/505,041	PHOTOINITIATED OPTICAL ADHESIVE AND METHOD FOR USING SAME	07/17/2009	02/21/2017	9,573,346	United States
14/192,130	RIGID LCD ASSEMBLY	02/27/2014	05/24/2016	9,348,174	United States
14/740,581	SEALED TRANSPARENT LIQUID CRYSTAL DISPLAY ASSEMBLY	06/16/2015	01/03/2017	9,535,293	United States
12/556,029	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS	09/09/2009	02/12/2013	8,373,841	United States
12/266,233	SPEAKER CONFIGURATION	11/06/2008	07/17/2012	8,223,999	United States
14/553,086	SUSPENDED ELECTRONIC DISPLAY AND COOLING ASSEMBLY	11/25/2014	03/08/2016	9,282,676	United States

MRI00013427

App. No.	Title	App Date	Grant Date	Patent No.	Country
13/081,111	SYSTEM AND METHOD FOR CALIBRATING BACKLIGHT DEVICES	04/06/2011	08/13/2013	8,508,155	United States
12/711,600	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/29/2013	8,569,910	United States
2010218083	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/06/2016	2010218083	Australia
214816	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	07/22/2016	214816	Israel
12/711,407	SYSTEM AND METHOD FOR DISPLAYING MULTIPLE IMAGES/VIDEOS ON A SINGLE DISPLAY	02/24/2010	03/19/2013	8,400,570	United States
13/361,305	SYSTEM AND METHOD FOR DYNAMIC LOAD SHARING BETWEEN ELECTRONIC DISPLAYS	01/30/2012	03/15/2016	9,286,020	United States
12/952,745	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	11/23/2010	04/08/2014	8,693,185	United States
12/954,134	SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS	11/24/2010	03/24/2015	8,988,011	United States
13/045,599	SYSTEM AND METHOD FOR REMOTELY IDENTIFYING DISPLAY COMPONENTS	03/11/2011	05/05/2015	9,026,686	United States
13/019,087	SYSTEM AND METHOD FOR SECURELY TRANSMITTING VIDEO DATA	02/01/2011	04/01/2014	8,689,343	United States

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App. No.	Title	App Date	Grant Date	Patent No.	Country
13/179,996	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	07/11/2011	02/05/2013	8,369,083	United States
13/759,744	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	02/05/2013	02/11/2014	8,649,170	United States
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2493592 T3	Spain
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Finland
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	France
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Great Britain
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Italy
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Norway
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Sweden
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	602008033034.6	Germany
2010-534262	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	08/30/2013	5351898	Japan

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App. No.	Title	App Date	Grant Date	Patent No.	Country
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	European Patent Convention
10-2010-7013306	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	11/25/2015	10-1573505	Republic of Korea
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Switzerland
97144317	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	05/11/2014	I437950	Taiwan
13/211,887	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/17/2011	08/12/2014	8,804,091	United States
12/706,652	SYSTEM FOR COOLING AN ELECTRONIC DISPLAY	02/16/2010	01/22/2013	8,358,397	United States
2011248190	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY	05/04/2011	11/26/2015	2011248190	Australia
13/100,580	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	05/04/2011	09/02/2014	8,823,916	United States
14/475,173	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	09/02/2014	08/25/2015	9,119,330	United States

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App. No.	Title	App Date	Grant Date	Patent No.	Country
14/664,213	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH CIRCULATING GAS AND AMBIENT GAS	03/20/2015	01/17/2017	9,549,490	United States
13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,749,749	United States
14/300,869	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	06/10/2014	03/24/2015	8,988,647	United States
13/279,401	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	10/24/2011	06/17/2014	8,755,021	United States
14/253,543	SYSTEM FOR REDUCING THE THERMAL INERTIA OF AN ELECTRONIC DISPLAY	04/15/2014	09/20/2016	9,448,569	United States
14/457,611	SYSTEM FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/12/2014	09/20/2016	9,451,733	United States
12/234,182	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS	09/19/2008	04/29/2014	8,711,321	United States
13/605,530	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	09/06/2012	07/09/2013	8,482,695	United States
13/937,777	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/09/2013	10/07/2014	8,854,572	United States

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App. No.	Title	App Date	Grant Date	Patent No.	Country
14/508,767	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	10/07/2014	07/21/2015	9,089,079	United States
14/803,848	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/20/2015	06/14/2016	9,370,127	United States
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,274,622	United States
2011129607	THERMAL CONTROL SYSTEM FOR AN ELECTRONIC DISPLAY	12/18/2009	04/20/2014	2513043	Russian Federation
12/630,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	12/03/2009	07/30/2013	8,497,972	United States
13/954,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	07/30/2013	04/12/2016	9,313,917	United States
12/763,797	VISUAL IDENTIFIER FOR IMAGES ON AN ELECTRONIC DISPLAY	04/20/2010	05/14/2013	8,441,574	United States
13/569,753	WIRE PASS THROUGH DEVICE	08/08/2012	06/23/2015	9,065,259	United States
14/741,118	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	12/27/2016	9,526,352	United States

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MRI LCD Display Patents

App. No.	Title	App Date	Grant Date	Pate
12/787,152	A METHOD FOR DRIVING A COOLING FAN WITHIN AN ELECTRONIC DISPLAY	05/25/2010	04/15/2014	8,7C
12/266,749	ADVERTISING DISPLAYS	11/07/2008	09/13/2011	8,01
13/858,426	APPARATUS AND METHOD FOR	04/08/2013	04/19/2016	9,31

App. No.	Title	App Date	Grant Date	Pate
	ASSEMBLING LARGE ELECTRONIC DISPLAYS			
12/124,741	BACKLIGHT ADJUSTMENT SYSTEM	05/21/2008	02/28/2012	8,12
13/353,371	BACKLIGHT ADJUSTMENT SYSTEM	01/19/2012	09/09/2014	8,82
14/447,164	BACKLIGHT ADJUSTMENT SYSTEM	07/30/2014	05/12/2015	9,03
14/709,045	BACKLIGHT ADJUSTMENT SYSTEM	05/11/2015	10/20/2015	9,16
12/693,148	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME	01/25/2010	01/08/2013	8,35
13/678,226	COMBINED SERIAL/PARALLEL	11/15/2012	02/11/2014	8,64

App. No.	Title	App Date	Grant Date	Pate
	LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME			
12/411,925	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	03/26/2009	10/07/2014	8,85
14/508,621	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	10/07/2014	10/27/2015	9,17
14/740,865	COOLING SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,5C
12/556,209	COOLING SYSTEM FOR OUTDOOR ELECTRONIC DISPLAYS	09/09/2009	02/19/2013	8,37

App. No.	Title	App Date	Grant Date	Pate
12/330,041	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE	12/08/2008	05/29/2012	8,18
12/793,474	DYNAMIC DIMMING LED BACKLIGHT	06/03/2010	01/08/2013	8,35
13/722,537	DYNAMIC DIMMING LED BACKLIGHT	12/20/2012	04/22/2014	8,7C
13/850,854	DYNAMIC DIMMING LED BACKLIGHT	03/26/2013	08/12/2014	8,8C
12/905,704	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	10/15/2010	07/08/2014	8,77
14/326,053	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	07/08/2014	03/15/2016	9,28
13/644,743	FIELD SERVICABLE ELECTRONIC DISPLAY	10/04/2012	06/30/2015	9,07

App. No.	Title	App Date	Grant Date	Pate
14/754,120	FIELD SERVICABLE ELECTRONIC DISPLAY	06/29/2015	04/12/2016	9,31
12/618,104	FIELD SERVICEABLE ELECTRONIC DISPLAY	11/13/2009	11/13/2012	8,31
14/326,059	FIGURE EIGHT CLOSED LOOP COOLING SYSTEM FOR ELECTRONIC DISPLAY	07/08/2014	10/18/2016	9,47
12/125,046	FRAME SEAL METHODS FOR LCD	05/21/2008	10/22/2013	8,56
29/322,897	GAS STATION TELEVISION	08/14/2008	07/07/2009	D59
12/641,468	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	12/18/2009	02/18/2014	8,65
14/050,464	HEAT EXCHANGER FOR AN ELECTRONIC	10/10/2013	08/25/2015	9,11

App. No.	Title	App Date	Grant Date	Pate
	DISPLAY			
12/753,298	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	04/02/2010	01/08/2013	8,35
13/692,657	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	12/03/2012	05/12/2015	9,03
14/702,443	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	05/01/2015	10/27/2015	9,17
12/833,514	ISOLATED ACCESS ASSEMBLY FOR BACK-TO-BACK ELECTRONIC DISPLAY AND STATIC DISPLAY	07/09/2010	04/16/2013	8,41
12/237,365	ISOLATED COOLING SYSTEM HAVING AN INSULATOR	09/24/2008	11/04/2014	8,87

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	GAP AND FRONT POLARIZER			
12/234,307	ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	09/19/2008	07/01/2014	8,76
14/740,746	LED ASSEMBLY FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,5C
13/650,951	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	10/12/2012	03/24/2015	8,9E
14/230,765	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	03/31/2014	12/13/2016	9,51
12/209,841	Liquid crystal display assembly comprising an LED backlight assembly and a	09/12/2008	09/17/2013	8,53

App. No.	Title	App Date	Grant Date	Pate
	movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly			
12/915,718	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT	10/29/2010	06/24/2014	8,76
13/045,272	MODULAR SYSTEM FOR CONTROLLING A LIQUID CRYSTAL DISPLAY	03/10/2011	02/21/2017	9,57
12/505,041	PHOTOINITIATED OPTICAL ADHESIVE AND METHOD FOR USING SAME	07/17/2009	02/21/2017	9,57
14/192,130	RIGID LCD ASSEMBLY	02/27/2014	05/24/2016	9,34
14/740,581	SEALED	06/16/2015	01/03/2017	9,53

App. No.	Title	App Date	Grant Date	Pate
	TRANSPARENT LIQUID CRYSTAL DISPLAY ASSEMBLY			
12/556,029	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS	09/09/2009	02/12/2013	8,37
12/266,233	SPEAKER CONFIGURATION	11/06/2008	07/17/2012	8,22
14/553,086	SUSPENDED ELECTRONIC DISPLAY AND COOLING ASSEMBLY	11/25/2014	03/08/2016	9,28
13/081,111	SYSTEM AND METHOD FOR CALIBRATING BACKLIGHT DEVICES	04/06/2011	08/13/2013	8,5C
12/711,600	SYSTEM AND METHOD FOR CONTROLLING	02/24/2010	10/29/2013	8,56

App. No.	Title	App Date	Grant Date	Pate
	THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW			
2010218083	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/06/2016	201
214816	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	07/22/2016	214
12/711,407	SYSTEM AND METHOD FOR DISPLAYING MULTIPLE IMAGES/VIDEOS ON A SINGLE DISPLAY	02/24/2010	03/19/2013	8,4C

App. No.	Title	App Date	Grant Date	Pate
13/361,305	SYSTEM AND METHOD FOR DYNAMIC LOAD SHARING BETWEEN ELECTRONIC DISPLAYS	01/30/2012	03/15/2016	9,28
12/952,745	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	11/23/2010	04/08/2014	8,69
12/954,134	SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS	11/24/2010	03/24/2015	8,98
13/045,599	SYSTEM AND METHOD FOR REMOTELY IDENTIFYING DISPLAY COMPONENTS	03/11/2011	05/05/2015	9,02

App. No.	Title	App Date	Grant Date	Pate
13/019,087	SYSTEM AND METHOD FOR SECURELY TRANSMITTING VIDEO DATA	02/01/2011	04/01/2014	8,68
13/179,996	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	07/11/2011	02/05/2013	8,36
13/759,744	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	02/05/2013	02/11/2014	8,64
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	249
08848846.5	SYSTEM AND	11/17/2008	06/25/2014	222

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	METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY			
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222

App. No.	Title	App Date	Grant Date	Pate
	DISPLAY			
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	602
2010-534262	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	08/30/2013	535
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
10-2010-7013306	SYSTEM AND METHOD FOR	11/17/2008	11/25/2015	10-1

App. No.	Title	App Date	Grant Date	Pate
	THERMALLY CONTROLLING AN ELECTRONIC DISPLAY			
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	222
97144317	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	05/11/2014	1437
13/211,887	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/17/2011	08/12/2014	8,8C
12/706,652	SYSTEM FOR COOLING AN ELECTRONIC DISPLAY	02/16/2010	01/22/2013	8,35

App. No.	Title	App Date	Grant Date	Pate
2011248190	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY	05/04/2011	11/26/2015	201
13/100,580	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	05/04/2011	09/02/2014	8,82
14/475,173	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	09/02/2014	08/25/2015	9,11
14/664,213	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH CIRCULATING GAS AND AMBIENT GAS	03/20/2015	01/17/2017	9,54

App. No.	Title	App Date	Grant Date	Pate
13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,74
14/300,869	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	06/10/2014	03/24/2015	8,98
13/279,401	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	10/24/2011	06/17/2014	8,75
14/253,543	SYSTEM FOR REDUCING THE THERMAL INERTIA OF AN ELECTRONIC DISPLAY	04/15/2014	09/20/2016	9,44
14/457,611	SYSTEM FOR	08/12/2014	09/20/2016	9,45

App. No.	Title	App Date	Grant Date	Pate
	THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS			
12/234,182	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS	09/19/2008	04/29/2014	8,71
13/605,530	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	09/06/2012	07/09/2013	8,48
13/937,777	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/09/2013	10/07/2014	8,85

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14/508,767	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	10/07/2014	07/21/2015	9,08
14/803,848	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/20/2015	06/14/2016	9,37
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,27
2011129607	THERMAL	12/18/2009	04/20/2014	251

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	CONTROL SYSTEM FOR AN ELECTRONIC DISPLAY			
12/630,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	12/03/2009	07/30/2013	8,49
13/954,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	07/30/2013	04/12/2016	9,31
12/763,797	VISUAL IDENTIFIER FOR IMAGES ON AN ELECTRONIC DISPLAY	04/20/2010	05/14/2013	8,44
13/569,753	WIRE PASS THROUGH DEVICE	08/08/2012	06/23/2015	9,06
14/741,118	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	12/27/2016	9,52

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United States	12/411,925	03/26/2009	8,854,595	10/07/2014	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	14/508,621	10/07/2014			CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/693,148	01/25/2010	8,351,013	01/08/2013	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME
United States	13/678,226	11/15/2012	8,648,993	02/11/2014	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME
United States	12/209,841	09/12/2008	8,537,302	09/17/2013	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly
United States	13/894,879	05/15/2013			REMOVABLE TILES FOR ELECTRONIC DISPLAY BACKLIGHTS
United States	12/330,041	12/08/2008	8,189,134	05/29/2012	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE
United States	12/235,200	09/22/2008			ISOLATED GAS HEATING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/234,182	09/19/2008	8,711,321	04/29/2014	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS
United States	12/124,741	05/21/2008	8,125,163	02/28/2012	BACKLIGHT ADJUSTMENT SYSTEM
United States	13/353,371	01/19/2012	8,829,815	09/09/2014	BACKLIGHT ADJUSTMENT SYSTEM
United States	14/447,164	07/30/2014			BACKLIGHT ADJUSTMENT SYSTEM
United States	12/556,029	09/09/2009	8,373,841	02/12/2013	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS
United States	12/556,209	09/09/2009	8,379,182	02/19/2013	COOLING SYSTEM FOR OUTDOOR ELECTRONIC DISPLAYS
United States	12/266,749	11/07/2008	8,016,452	09/13/2011	ADVERTISING DISPLAYS
United States	12/125,046	05/21/2008	8,562,770	10/22/2013	FRAME SEAL METHODS FOR LCD

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Germany	8848846.5	11/17/2008	602008033034.6	06/25/2014	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY
Japan	97144317	11/17/2008	1437950	05/11/2014	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC
United States	13/605,530	09/06/2012	8,482,695	07/09/2013	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	13/937,777	07/09/2013	8,854,572	10/07/2014	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	14/508,767	10/07/2014			SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	12/411,925	03/26/2009	8,854,595	10/07/2014	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	14/508,621	10/07/2014			CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/693,148	01/25/2010	8,351,013	01/08/2013	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME
United States	13/678,226	11/15/2012	8,648,993	02/11/2014	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME
United States	12/209,841	09/12/2008	8,537,302	09/17/2013	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly
United States	13/894,879	05/15/2013			REMOVABLE TILES FOR ELECTRONIC DISPLAY BACKLIGHTS
United States	12/330,041	12/08/2008	8,189,134	05/29/2012	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE
United States	12/235,200	09/22/2008			ISOLATED GAS HEATING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/234,182	09/19/2008	8,711,321	04/29/2014	SYSTEM FOR THERMALLY CONTROLLING

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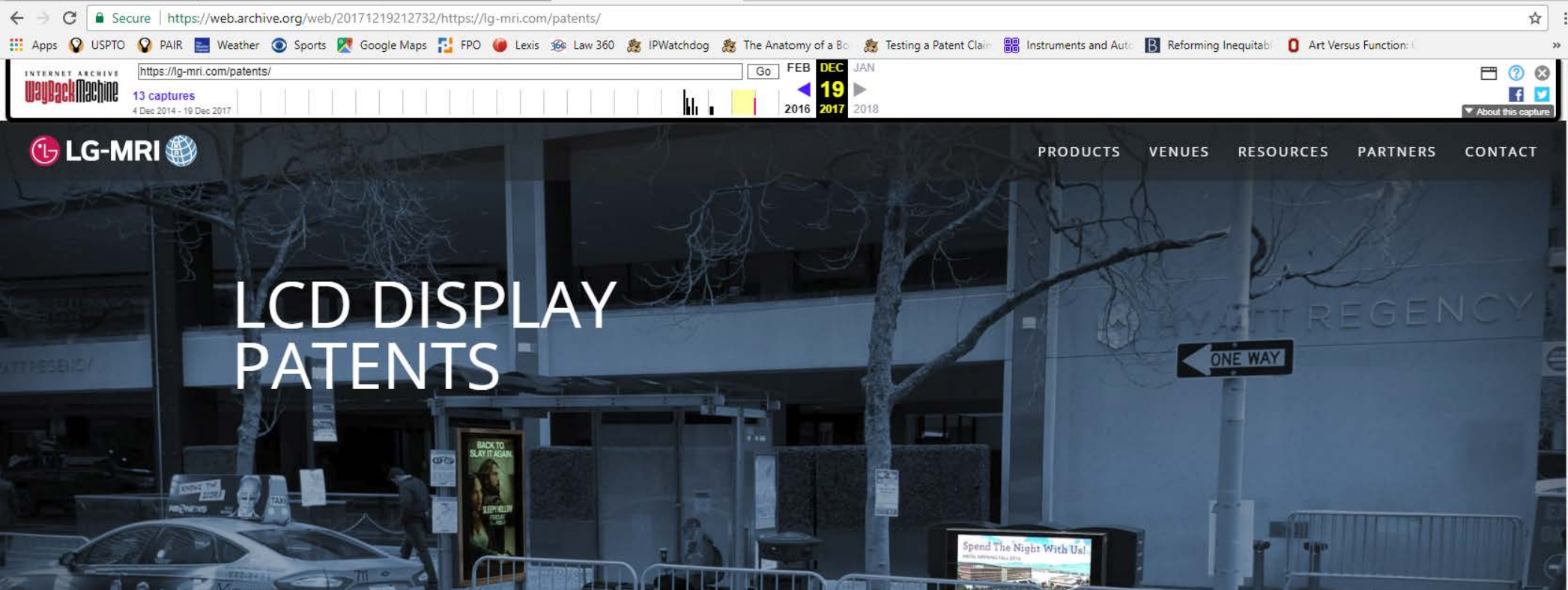
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public of rea	10-2011-7030760	06/03/2010			DYNAMIC DIMMING LED BACKLIGHT
ited States	13/722,537	12/20/2012	8,704,752	04/22/2014	DYNAMIC DIMMING LED BACKLIGHT
ited States	13/850,854	03/26/2013	8,803,790	08/12/2014	DYNAMIC DIMMING LED BACKLIGHT
ited States	14/453,966	08/07/2014			DYNAMIC DIMMING LED BACKLIGHT
ited States	12/618,104	11/13/2009	8,310,824	11/13/2012	FIELD SERVICEABLE ELECTRONIC DISPLAY
ropean Patent vention	10830484.1	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
nada	2,780,884	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
ustralia	2010319888	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
razil	1120120121669	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
ited States	13/644,743	10/04/2012			FIELD SERVICEABLE ELECTRONIC DISPLAY
ited States	12/905,704	10/15/2010	8,773,633	07/08/2014	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS
ited States	14/326,053	07/08/2014			EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS
ited States	12/630,469	12/03/2009	8,497,972	07/30/2013	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY
ited States	13/954,469	07/30/2013			THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY
ited States	12/915,718	10/29/2010	8,760,613	06/24/2014	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT
ited States	12/952,745	11/23/2010	8,693,185	04/08/2014	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY
ited States	14/247,658	04/08/2014			SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY
ited States	12/954,134	11/24/2010			SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS
ited States	12/986,787	04/07/2014			SYSTEM AND METHOD FOR REMOTELY

United States	12/411,925	03/26/2009	8,854,595	10/07/2014	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	14/508,621	10/07/2014			CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/693,148	01/25/2010	8,351,013	01/08/2013	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME
United States	13/678,226	11/15/2012	8,648,993	02/11/2014	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME
United States	12/209,841	09/12/2008	8,537,302	09/17/2013	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly
United States	13/894,879	05/15/2013			REMOVABLE TILES FOR ELECTRONIC DISPLAY BACKLIGHTS
United States	12/330,041	12/08/2008	8,189,134	05/29/2012	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE
United States	12/235,200	09/22/2008			ISOLATED GAS HEATING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/234,182	09/19/2008	8,711,321	04/29/2014	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS
United States	12/124,741	05/21/2008	8,125,163	02/28/2012	BACKLIGHT ADJUSTMENT SYSTEM
United States	13/353,371	01/19/2012	8,829,815	09/09/2014	BACKLIGHT ADJUSTMENT SYSTEM
United States	14/447,164	07/30/2014			BACKLIGHT ADJUSTMENT SYSTEM
United States	12/556,029	09/09/2009	8,373,841	02/12/2013	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS
United States	12/556,209	09/09/2009	8,379,182	02/19/2013	COOLING SYSTEM FOR OUTDOOR ELECTRONIC DISPLAYS
United States	12/266,749	11/07/2008	8,016,452	09/13/2011	ADVERTISING DISPLAYS
United States	12/125,046	05/21/2008	8,562,770	10/22/2013	FRAME SEAL METHODS FOR LCD

Internet Archive Wayback Machine					
11 captures 4 Dec 2014 - 2 Feb 2016					
United States	13/605,530	09/06/2012	8,482,695	07/09/2013	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	13/937,777	07/09/2013	8,854,572	10/07/2014	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	14/508,767	10/07/2014			SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE
United States	12/411,925	03/26/2009	8,854,595	10/07/2014	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	14/508,621	10/07/2014			CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/693,148	01/25/2010	8,351,013	01/08/2013	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME
United States	13/678,226	11/15/2012	8,648,993	02/11/2014	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME
United States	12/209,841	09/12/2008	8,537,302	09/17/2013	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly
United States	13/894,879	05/15/2013			REMOVABLE TILES FOR ELECTRONIC DISPLAY BACKLIGHTS
United States	12/330,041	12/08/2008	8,189,134	05/29/2012	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE
United States	12/235,200	09/22/2008			ISOLATED GAS HEATING SYSTEM FOR AN ELECTRONIC DISPLAY
United States	12/234,182	09/19/2008	8,711,321	04/29/2014	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS
United States	12/124,741	05/21/2008	8,125,163	02/28/2012	BACKLIGHT ADJUSTMENT SYSTEM
United States	13/353,371	01/19/2012	8,829,815	09/09/2014	BACKLIGHT ADJUSTMENT SYSTEM

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ited States	13/850,854	03/26/2013	8,803,790	08/12/2014	DYNAMIC DIMMING LED BACKLIGHT
ited States	14/453,966	08/07/2014			DYNAMIC DIMMING LED BACKLIGHT
ited States	12/618,104	11/13/2009	8,310,824	11/13/2012	FIELD SERVICEABLE ELECTRONIC DISPLAY
ropean Patent	10830484.1	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
nada	2,780,884	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
ustralia	2010319888	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
razil	1120120121669	10/29/2010			FIELD SERVICEABLE ELECTRONIC DISPLAY
ited States	13/644,743	10/04/2012			FIELD SERVICEABLE ELECTRONIC DISPLAY
ited States	12/905,704	10/15/2010	8,773,633	07/08/2014	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS
ited States	14/326,053	07/08/2014			EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS
ited States	12/630,469	12/03/2009	8,497,972	07/30/2013	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY
ited States	13/954,469	07/30/2013			THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY
ited States	12/915,718	10/29/2010	8,760,613	06/24/2014	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT
ited States	12/952,745	11/23/2010	8,693,185	04/08/2014	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY
ited States	14/247,658	04/08/2014			SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY
ited States	12/954,134	11/24/2010			SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS
ited States	12/986,787	04/07/2014			SYSTEM AND METHOD FOR REMOTELY



App. No.	Title	App Date	Grant Date	Patent No.	Country
12/787,152	A METHOD FOR DRIVING A COOLING FAN WITHIN AN ELECTRONIC DISPLAY	05/25/2010	04/15/2014	8,700,226	United States
12/266,749	ADVERTISING DISPLAYS	11/07/2008	09/13/2011	8,016,452	United States
13/858,426	APPARATUS AND METHOD FOR ASSEMBLING LARGE ELECTRONIC DISPLAYS	04/08/2013	04/19/2016	9,317,060	United States
12/124,741	BACKLIGHT ADJUSTMENT SYSTEM	05/21/2008	02/28/2012	8,125,163	United States

12/124,741	BACKLIGHT ADJUSTMENT SYSTEM	05/21/2008	02/28/2012	8,125,163	United States
13/353,371	BACKLIGHT ADJUSTMENT SYSTEM	01/19/2012	09/09/2014	8,829,815	United States
14/447,164	BACKLIGHT ADJUSTMENT SYSTEM	07/30/2014	05/12/2015	9,030,129	United States
14/709,045	BACKLIGHT ADJUSTMENT SYSTEM	05/11/2015	10/20/2015	9,167,655	United States
12/693,148	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING SAME	01/25/2010	01/08/2013	8,351,013	United States
13/678,226	COMBINED SERIAL/PARALLEL LIGHT CONFIGURATION AND SINGLE LAYER PCB CONTAINING THE SAME	11/15/2012	02/11/2014	8,648,993	United States
12/411,925	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	03/26/2009	10/07/2014	8,854,595	United States
14/508,621	CONSTRICTED CONVECTION COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	10/07/2014	10/27/2015	9,173,322	United States
14/740,865	COOLING SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,500,896	United States
12/556,209	COOLING SYSTEM FOR OUTDOOR ELECTRONIC DISPLAYS	09/09/2009	02/19/2013	8,379,182	United States
12/330,041	DURABLE DISPLAY PANEL WITH IMPACT RESISTANCE	12/08/2008	05/29/2012	8,189,134	United States
12/793,474	DYNAMIC DIMMING LED BACKLIGHT	06/03/2010	01/08/2013	8,350,799	United States

12/793,474	DYNAMIC DIMMING LED BACKLIGHT	06/03/2010	01/08/2013	8,350,799	United States
13/722,537	DYNAMIC DIMMING LED BACKLIGHT	12/20/2012	04/22/2014	8,704,752	United States
13/850,854	DYNAMIC DIMMING LED BACKLIGHT	03/26/2013	08/12/2014	8,803,790	United States
12/905,704	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	10/15/2010	07/08/2014	8,773,633	United States
14/326,053	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	07/08/2014	03/15/2016	9,285,108	United States
13/644,743	FIELD SERVICABLE ELECTRONIC DISPLAY	10/04/2012	06/30/2015	9,072,166	United States
14/754,120	FIELD SERVICABLE ELECTRONIC DISPLAY	06/29/2015	04/12/2016	9,313,447	United States
12/618,104	FIELD SERVICEABLE ELECTRONIC DISPLAY	11/13/2009	11/13/2012	8,310,824	United States
14/326,059	FIGURE EIGHT CLOSED LOOP COOLING SYSTEM FOR ELECTRONIC DISPLAY	07/08/2014	10/18/2016	9,470,924	United States
12/125,046	FRAME SEAL METHODS FOR LCD	05/21/2008	10/22/2013	8,562,770	United States
29/322,897	GAS STATION TELEVISION	08/14/2008	07/07/2009	D595,678	United States
12/641,468	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	12/18/2009	02/18/2014	8,654,302	United States
14/050,464	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	10/10/2013	08/25/2015	9,119,325	United States

14/050,464	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	10/10/2013	08/25/2015	9,119,325	United States
12/753,298	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	04/02/2010	01/08/2013	8,351,014	United States
13/692,657	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	12/03/2012	05/12/2015	9,030,641	United States
14/702,443	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	05/01/2015	10/27/2015	9,173,325	United States
12/833,514	ISOLATED ACCESS ASSEMBLY FOR BACK-TO-BACK ELECTRONIC DISPLAY AND STATIC DISPLAY	07/09/2010	04/16/2013	8,418,387	United States
12/237,365	ISOLATED COOLING SYSTEM HAVING AN INSULATOR GAP AND FRONT POLARIZER	09/24/2008	11/04/2014	8,879,042	United States
12/234,307	ISOLATED GAS COOLING SYSTEM FOR AN ELECTRONIC DISPLAY	09/19/2008	07/01/2014	8,767,165	United States
14/740,746	LED ASSEMBLY FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	06/16/2015	11/22/2016	9,500,801	United States
13/650,951	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	10/12/2012	03/24/2015	8,988,635	United States
14/230,765	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	03/31/2014	12/13/2016	9,519,185	United States
12/209,841	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly	09/12/2008	09/17/2013	8,537,302	United States
12/915,718	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT	10/29/2010	06/24/2014	8,760,613	United States

12/915,718	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT	10/29/2010	06/24/2014	8,760,613	United States
13/045,272	MODULAR SYSTEM FOR CONTROLLING A LIQUID CRYSTAL DISPLAY	03/10/2011	02/21/2017	9,578,273	United States
12/505,041	PHOTOINITIATED OPTICAL ADHESIVE AND METHOD FOR USING SAME	07/17/2009	02/21/2017	9,573,346	United States
14/192,130	RIGID LCD ASSEMBLY	02/27/2014	05/24/2016	9,348,174	United States
14/740,581	SEALED TRANSPARENT LIQUID CRYSTAL DISPLAY ASSEMBLY	06/16/2015	01/03/2017	9,535,293	United States
12/556,029	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS	09/09/2009	02/12/2013	8,373,841	United States
12/266,233	SPEAKER CONFIGURATION	11/06/2008	07/17/2012	8,223,999	United States
14/553,086	SUSPENDED ELECTRONIC DISPLAY AND COOLING ASSEMBLY	11/25/2014	03/08/2016	9,282,676	United States
13/081,111	SYSTEM AND METHOD FOR CALIBRATING BACKLIGHT DEVICES	04/06/2011	08/13/2013	8,508,155	United States
12/711,600	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/29/2013	8,569,910	United States
2010218083	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/06/2016	2010218083	Australia
214816	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	07/22/2016	214816	Israel

214816	OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	07/22/2016	214816	Israel
12/711,407	SYSTEM AND METHOD FOR DISPLAYING MULTIPLE IMAGES/VIDEOS ON A SINGLE DISPLAY	02/24/2010	03/19/2013	8,400,570	United States
13/361,305	SYSTEM AND METHOD FOR DYNAMIC LOAD SHARING BETWEEN ELECTRONIC DISPLAYS	01/30/2012	03/15/2016	9,286,020	United States
12/952,745	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	11/23/2010	04/08/2014	8,693,185	United States
12/954,134	SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS	11/24/2010	03/24/2015	8,988,011	United States
13/045,599	SYSTEM AND METHOD FOR REMOTELY IDENTIFYING DISPLAY COMPONENTS	03/11/2011	05/05/2015	9,026,686	United States
13/019,087	SYSTEM AND METHOD FOR SECURELY TRANSMITTING VIDEO DATA	02/01/2011	04/01/2014	8,689,343	United States
13/179,996	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	07/11/2011	02/05/2013	8,369,083	United States
13/759,744	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	02/05/2013	02/11/2014	8,649,170	United States
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2493592 T3	Spain
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Finland
	SYSTEM AND METHOD FOR THERMALLY				

08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2493592 T3	Spain
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Finland
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	France
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Great Britain
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Italy
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Norway
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Sweden
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	602008033034.6	Germany
2010-534262	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	08/30/2013	5351898	Japan
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	European Patent Convention
10-2010-7013306	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	11/25/2015	10-1573505	Republic of Korea
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Switzerland
07144217	SYSTEM AND METHOD FOR THERMALLY	11/17/2008	05/11/2014	1427050	Taiwan

10-2010-7013306	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	11/25/2015	10-1573505	Republic of Korea
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Switzerland
97144317	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	05/11/2014	1437950	Taiwan
13/211,887	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/17/2011	08/12/2014	8,804,091	United States
12/706,652	SYSTEM FOR COOLING AN ELECTRONIC DISPLAY	02/16/2010	01/22/2013	8,358,397	United States
2011248190	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY	05/04/2011	11/26/2015	2011248190	Australia
13/100,580	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	05/04/2011	09/02/2014	8,823,916	United States
14/475,173	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	09/02/2014	08/25/2015	9,119,330	United States
14/664,213	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH CIRCULATING GAS AND AMBIENT GAS	03/20/2015	01/17/2017	9,549,490	United States
13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,749,749	United States
14/300,869	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	06/10/2014	03/24/2015	8,988,647	United States
13/279,401	SYSTEM FOR COOLING AN ELECTRONIC IMAGE	10/24/2011	06/17/2014	8,755,021	United

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13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,749,749	United States
14/300,869	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	06/10/2014	03/24/2015	8,988,647	United States
13/279,401	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	10/24/2011	06/17/2014	8,755,021	United States
14/253,543	SYSTEM FOR REDUCING THE THERMAL INERTIA OF AN ELECTRONIC DISPLAY	04/15/2014	09/20/2016	9,448,569	United States
14/457,611	SYSTEM FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/12/2014	09/20/2016	9,451,733	United States
12/234,182	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS	09/19/2008	04/29/2014	8,711,321	United States
13/605,530	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	09/06/2012	07/09/2013	8,482,695	United States
13/937,777	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/09/2013	10/07/2014	8,854,572	United States
14/508,767	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	10/07/2014	07/21/2015	9,089,079	United States
14/803,848	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/20/2015	06/14/2016	9,370,127	United States
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,274,622	United States

14/803,848	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/20/2015	06/14/2016	9,370,127	United States
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,274,622	United States
2011129607	THERMAL CONTROL SYSTEM FOR AN ELECTRONIC DISPLAY	12/18/2009	04/20/2014	2513043	Russian Federation
12/630,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	12/03/2009	07/30/2013	8,497,972	United States
13/954,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	07/30/2013	04/12/2016	9,313,917	United States
12/763,797	VISUAL IDENTIFIER FOR IMAGES ON AN ELECTRONIC DISPLAY	04/20/2010	05/14/2013	8,441,574	United States
13/569,753	WIRE PASS THROUGH DEVICE	08/08/2012	06/23/2015	9,065,259	United States
14/741,118	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	12/27/2016	9,526,352	United States
14/247,658	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	04/08/2014	03/14/2017	9,594,271	United States

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14/247,658	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	04/08/2014	03/14/2017	9,594,271	United States
14/590,542	ADVANCED COOLING SYSTEM FOR ELECTRONIC DISPLAY	01/06/2015	04/04/2017	9,613,548	United States
14/746,271	WIRE PASS THROUGH DEVICE	06/22/2015	04/18/2017	9,627,875	United States
15/180,968	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	06/13/2016	04/18/2017	9,629,287	United States
14/740,997	SYSTEM FOR TRACKING AND ANALYZING DISPLAY CASE USAGE	06/16/2015	04/25/2017	9,633,366	United States
12/684,608	ELECTRONIC DISPLAY WITH MOUNT-ACCESSIBLE COMPONENTS	01/08/2010	05/09/2017	9,648,270	United States
14/198,141	HEAT EXCHANGER ASSEMBLY FOR AN ELECTRONIC DISPLAY	03/05/2014	05/09/2017	9,648,790	United States
14/645,076	HYBRID REAR COVER AND MOUNTING BRACKET FOR ELECTRONIC DISPLAY	03/11/2015	05/16/2017	9,655,289	United States
15/388,250	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	12/22/2016	05/30/2017	9,661,939	United States
15/357,498	LED ASSEMBLY FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	11/21/2016	06/20/2017	9,684,124	United States
14/322,962	AIRGUIDE BACKLIGHT ASSEMBLY	07/03/2014	06/27/2017	9,690,137	United States
14/624,268	PERIMETER VENTILATION SYSTEM FOR ELECTRONIC DISPLAY	02/17/2015	08/01/2017	9,723,765	United States

13/357,498	CRYSTAL DISPLAY	11/21/2016	06/20/2017	9,884,124	States
14/322,962	AIRGUIDE BACKLIGHT ASSEMBLY	07/03/2014	06/27/2017	9,690,137	United States
14/624,268	PERIMETER VENTILATION SYSTEM FOR ELECTRONIC DISPLAY	02/17/2015	08/01/2017	9,723,765	United States
15/357,917	COOLING SYSTEM FOR LIQUID CRYSTAL DISPLAY	11/21/2016	08/15/2017	9,733,420	United States
15/069,154	EXPANDED HEAT SINK FOR ELECTRONIC DISPLAYS	03/14/2016	10/24/2017	9,797,588	United States
14/346,884	SYSTEM AND METHOD FOR ENVIRONMENTAL ADAPTATION OF DISPLAY CHARACTERISTICS	03/24/2014	10/24/2017	9,799,306	United States
14/834,034	HEAT EXCHANGER FOR AN ELECTRONIC DISPLAY	08/24/2015	10/24/2017	9,801,305	United States
12/986,787	SYSTEM AND METHOD FOR REMOTELY MONITORING THE OPERATING LIFE OF ELECTRONIC DISPLAYS	01/07/2011	11/07/2017	9,812,047	United States
14/756,781	SYSTEM FOR DECREASING ENERGY USAGE OF A TRANSPARENT LCD DISPLAY CASE	10/09/2015	11/28/2017	9,832,847	United States
14/923,164	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	10/26/2015	12/05/2017	9,835,893	United States

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MRI LCD Display Patents

App. No.	Title	App Date	Grant Date	Patent No.	Country
12/787,152	A METHOD FOR DRIVING A COOLING FAN WITHIN AN ELECTRONIC DISPLAY	05/25/2010	04/15/2014	8,700,226	United States
12/266,749	ADVERTISING DISPLAYS	11/07/2008	09/13/2011	8,016,452	United States
13/858,426	APPARATUS AND METHOD FOR ASSEMBLING LARGE ELECTRONIC DISPLAYS	04/08/2013	04/19/2016	9,317,060	United States
12/124,741	BACKLIGHT ADJUSTMENT SYSTEM	05/21/2008	02/28/2012	8,125,163	United States
13/353,371	BACKLIGHT ADJUSTMENT SYSTEM	01/19/2012	09/09/2014	8,829,815	United States
14/447,164	BACKLIGHT ADJUSTMENT SYSTEM	07/30/2014	05/12/2015	9,030,129	United States
14/709,045	BACKLIGHT ADJUSTMENT SYSTEM	05/11/2015	10/20/2015	9,167,655	United States

Patent No.	Patent Title	Filed	Granted	Value	Country
13/650,951	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	10/12/2012	03/24/2015	8,988,635	United States
14/230,765	LIGHTING SYSTEM FOR TRANSPARENT LIQUID CRYSTAL DISPLAY	03/31/2014	12/13/2016	9,519,185	United States
12/209,841	Liquid crystal display assembly comprising an LED backlight assembly and a movable element placed behind the LED backlight assembly having a hinge to allow access to a rear portion of the LED backlight assembly	09/12/2008	09/17/2013	8,537,302	United States
12/915,718	MODULAR DISTRIBUTED COMPONENTS FOR LED BACKLIGHT	10/29/2010	06/24/2014	8,760,613	United States
13/045,272	MODULAR SYSTEM FOR CONTROLLING A LIQUID CRYSTAL DISPLAY	03/10/2011	02/21/2017	9,578,273	United States
12/505,041	PHOTOINITIATED OPTICAL ADHESIVE AND METHOD FOR USING SAME	07/17/2009	02/21/2017	9,573,346	United States
14/192,130	RIGID LCD ASSEMBLY	02/27/2014	05/24/2016	9,348,174	United States
14/740,581	SEALED TRANSPARENT LIQUID CRYSTAL DISPLAY ASSEMBLY	06/16/2015	01/03/2017	9,535,293	United States
12/556,029	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS	09/09/2009	02/12/2013	8,373,841	United States
12/266,233	SPEAKER CONFIGURATION	11/06/2008	07/17/2012	8,223,999	United States

International						
12/556,029	SHARED ISOLATED GAS COOLING SYSTEM FOR OPPOSITELY FACING ELECTRONIC DISPLAYS	09/09/2009	02/12/2013	8,373,841	United States	
12/266,233	SPEAKER CONFIGURATION	11/06/2008	07/17/2012	8,223,999	United States	
14/553,086	SUSPENDED ELECTRONIC DISPLAY AND COOLING ASSEMBLY	11/25/2014	03/08/2016	9,282,676	United States	
13/081,111	SYSTEM AND METHOD FOR CALIBRATING BACKLIGHT DEVICES	04/06/2011	08/13/2013	8,508,155	United States	
12/711,600	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/29/2013	8,569,910	United States	
2010218083	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	10/06/2016	2010218083	Australia	
214816	SYSTEM AND METHOD FOR CONTROLLING THE OPERATION PARAMETERS OF A DISPLAY IN RESPONSE TO CURRENT DRAW	02/24/2010	07/22/2016	214816	Israel	
12/711,407	SYSTEM AND METHOD FOR DISPLAYING MULTIPLE IMAGES/VIDEOS ON A SINGLE DISPLAY	02/24/2010	03/19/2013	8,400,570	United States	
13/361,305	SYSTEM AND METHOD FOR DYNAMIC LOAD SHARING BETWEEN ELECTRONIC DISPLAYS	01/30/2012	03/15/2016	9,286,020	United States	
12/952,745	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN	11/23/2010	04/08/2014	8,693,185	United States	

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13/361,305	SYSTEM AND METHOD FOR DYNAMIC LOAD SHARING BETWEEN ELECTRONIC DISPLAYS	01/30/2012	03/15/2016	9,286,020	United States	
12/952,745	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	11/23/2010	04/08/2014	8,693,185	United States	
12/954,134	SYSTEM AND METHOD FOR MANAGING BACKLIGHT LUMINANCE VARIATIONS	11/24/2010	03/24/2015	8,988,011	United States	
13/045,599	SYSTEM AND METHOD FOR REMOTELY IDENTIFYING DISPLAY COMPONENTS	03/11/2011	05/05/2015	9,026,686	United States	
13/019,087	SYSTEM AND METHOD FOR SECURELY TRANSMITTING VIDEO DATA	02/01/2011	04/01/2014	8,689,343	United States	
13/179,996	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	07/11/2011	02/05/2013	8,369,083	United States	
13/759,744	SYSTEM AND METHOD FOR SELECTIVELY ENGAGING COOLING FANS WITHIN AN ELECTRONIC DISPLAY	02/05/2013	02/11/2014	8,649,170	United States	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2493592 T3	Spain	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Finland	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	France	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING	11/17/2008	06/25/2014	2225603	Great	

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08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	France	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Great Britain	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Italy	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Norway	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Sweden	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	602008033034.6	Germany	
2010-534262	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	08/30/2013	5351898	Japan	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	European Patent Convention	
10-2010-7013306	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	11/25/2015	10-1573505	Republic of Korea	
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Switzerland	

7013306	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	11/25/2015	10-1573505	Republic of Korea
08848846.5	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	06/25/2014	2225603	Switzerland
97144317	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY	11/17/2008	05/11/2014	1437950	Taiwan
13/211,887	SYSTEM AND METHOD FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/17/2011	08/12/2014	8,804,091	United States
12/706,652	SYSTEM FOR COOLING AN ELECTRONIC DISPLAY	02/16/2010	01/22/2013	8,358,397	United States
2011248190	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY	05/04/2011	11/26/2015	2011248190	Australia
13/100,580	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	05/04/2011	09/02/2014	8,823,916	United States
14/475,173	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH A HEAT EXCHANGER HAVING INTERNAL FANS	09/02/2014	08/25/2015	9,119,330	United States
14/664,213	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH CIRCULATING GAS AND AMBIENT GAS	03/20/2015	01/17/2017	9,549,490	United States
13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,749,749	United States

14/664,213	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH CIRCULATING GAS AND AMBIENT GAS	03/20/2015	01/17/2017	9,549,490	United States
13/100,556	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	05/04/2011	06/10/2014	8,749,749	United States
14/300,869	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	06/10/2014	03/24/2015	8,988,647	United States
13/279,401	SYSTEM FOR COOLING AN ELECTRONIC IMAGE ASSEMBLY WITH MANIFOLDS AND AMBIENT GAS	10/24/2011	06/17/2014	8,755,021	United States
14/253,543	SYSTEM FOR REDUCING THE THERMAL INERTIA OF AN ELECTRONIC DISPLAY	04/15/2014	09/20/2016	9,448,569	United States
14/457,611	SYSTEM FOR THERMALLY CONTROLLING AN ELECTRONIC DISPLAY WITH REDUCED NOISE EMISSIONS	08/12/2014	09/20/2016	9,451,733	United States
12/234,182	SYSTEM FOR THERMALLY CONTROLLING DISPLAYS	09/19/2008	04/29/2014	8,711,321	United States
13/605,530	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	09/06/2012	07/09/2013	8,482,695	United States
13/937,777	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/09/2013	10/07/2014	8,854,572	United States
14/508,767	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	10/07/2014	07/21/2015	9,089,079	United States

International						
	CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/09/2013	10/07/2014	8,854,572	States	
14/508,767	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	10/07/2014	07/21/2015	9,089,079	United States	
14/803,848	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	07/20/2015	06/14/2016	9,370,127	United States	
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,274,622	United States	
2011129607	THERMAL CONTROL SYSTEM FOR AN ELECTRONIC DISPLAY	12/18/2009	04/20/2014	2513043	Russian Federation	
12/630,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	12/03/2009	07/30/2013	8,497,972	United States	
13/954,469	THERMAL PLATE WITH OPTIONAL COOLING LOOP IN ELECTRONIC DISPLAY	07/30/2013	04/12/2016	9,313,917	United States	
12/763,797	VISUAL IDENTIFIER FOR IMAGES ON AN ELECTRONIC DISPLAY	04/20/2010	05/14/2013	8,441,574	United States	
13/569,753	WIRE PASS THROUGH DEVICE	08/08/2012	06/23/2015	9,065,259	United States	
14/741,118	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	06/16/2015	12/27/2016	9,526,352	United States	
	SYSTEM AND METHOD FOR MAINTAINING A				United	

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About this capture

Patent Number	Patent Title	Issue Date	Expiration Date	Current Status	Country
12/620,330	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP PLENUM AS THE CONVECTION PLATE	11/17/2009	09/25/2012	8,274,622	United States
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International	7030760	DYNAMIC DIMMING LED BACKLIGHT	06/03/2010	11/06/2017	10-1796718	Korea
	14/247,658	SYSTEM AND METHOD FOR MAINTAINING A CONSISTENT TEMPERATURE GRADIENT ACROSS AN ELECTRONIC DISPLAY	04/08/2014	03/14/2017	9,594,271	United States
	14/590,542	ADVANCED COOLING SYSTEM FOR ELECTRONIC DISPLAY	01/06/2015	04/04/2017	9,613,548	United States
	14/746,271	WIRE PASS THROUGH DEVICE	06/22/2015	04/18/2017	9,627,875	United States
	15/180,968	SYSTEM FOR USING CONSTRICTED CONVECTION WITH CLOSED LOOP COOLING SYSTEM AS THE CONVECTION PLATE	06/13/2016	04/18/2017	9,629,287	United States
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	15/388,250	WIRELESS VIDEO TRANSMISSION SYSTEM FOR LIQUID CRYSTAL DISPLAY	12/22/2016	05/30/2017	9,661,939	United States
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15/357,917	COOLING SYSTEM FOR LIQUID CRYSTAL DISPLAY	11/21/2016	08/15/2017	9,733,420	United States	
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12/986,787	SYSTEM AND METHOD FOR REMOTELY MONITORING THE OPERATING LIFE OF ELECTRONIC DISPLAYS	01/07/2011	11/07/2017	9,812,047	United States	
14/756,781	SYSTEM FOR DECREASING ENERGY USAGE OF A TRANSPARENT LCD DISPLAY CASE	10/09/2015	11/28/2017	9,832,847	United States	
14/923,164	HEAT EXCHANGER FOR BACK TO BACK ELECTRONIC DISPLAYS	10/26/2015	12/05/2017	9,835,893	United States	

14/322,962	AIRGUIDE BACKLIGHT ASSEMBLY	07/03/2014	06/27/2017	9,690,137	United States
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Patents

MRI products are covered under one or more of the following patents:

U.S. Patent Numbers

- 8,004,648
- 8,208,115
- 8,223,999
- 8,274,622
- 8,482,695
- 8,351,013
- 8,648,993
- 8,537,302
- 8,189,134
- 8,125,163
- 8,373,841
- 8,379,182
- 8,016,452
- 8,562,770
- D595,678
- 8,508,155
- 8,400,570
- 8,128,342
- 8,654,302
- 8,358,397
- 8,569,910
- 8,350,799
- 8,310,824
- 8,497,972
- 8,351,014
- 8,441,574
- 8,418,387
- 8,369,083
- 8,649,170

Canada Patent Number

- 200880124923.0

Israel Patent Number

- 5351898

Republic of Korea Patent Number

- 2493575

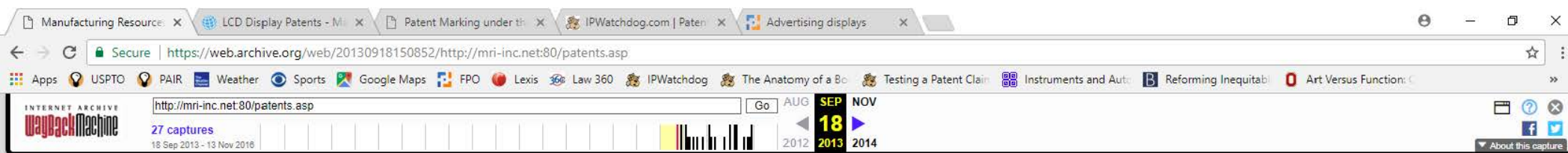
Singapore Patent Number

- 161561

All the MRI products are protected by the MRI patents but some of our new products, where we "cut" the LCD displays, are also covered by patents from Tannas Electronics Displays. These include the 67" ThruVu cooler door and our 44" TTU (Taxi Top Unit).

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Singapore Patent Number

- 161561..


All the MRI products are protected by the MRI patents but some of our new products, where we "cut" the LCD displays, also covered by patents from Tannas Electronics Displays. These include the new 67" ThruVu cooler door and very soon our 44" TTU (Taxi Top Unit).

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MRI00324232

Manufacturing Resources International

Products Info Request Educational About Us News Contact Us Home



Face-Steering Display - Montreal

Patents

MRI products are covered under one or more of the following patents:

U.S. Patent Numbers

- 8,004,648
- 8,208,115
- 8,223,999
- 8,274,622
- 8,482,695
- 8,351,013
- 8,648,993
- 8,537,302
- 8,189,124
- 8,125,163
- 8,373,841
- 8,379,182
- 8,016,452
- 8,562,770
- D595,678
- 8,508,155
- 8,400,570
- 8,128,342
- 8,654,302
- 8,358,397
- 8,569,910
- 8,350,799
- 8,310,824
- 8,497,972
- 8,351,014
- 8,441,574
- 8,418,387
- 8,360,803

Certain MRI displays may be covered under one or more of the following MRI patents:

Registration Number	Title
8,004,648	AIR CURTAIN FOR DISPLAY
8,125,163	BACKLIGHT ADJUSTMENT SYSTEM
8,016,452	ADVERTISING DISPLAYS
D595,678	GAS STATION TELEVISION
8,128,342	MULTIDIRECTIONAL MULTISOUND INFORMATION SYSTEM

ThruVu Cooler Door products are manufactured under license from Tannas Electronic Displays, Inc., USA and may be covered by one or more of the following patents:

6,204,906
7,525,633
7,535,547
7,780,492
7,708,223
7,938,051
8,068,206
12/848,931
12/773,687
12/781,624
13/088,186
11/049,621
13/310,690
13/275,624
61/556,150
61/557,287
CN Patent No. 100445844C

Manufacturing Resource: x LCD Display Patents - M Patent Marking under th IPWatchdog.com | Paten Advertising displays

Secure https://web.archive.org/web/20150902144714/http://www.mri-inc.net:80/patents.asp

Apps USPTO PAIR Weather Sports Google Maps FPO Lexis Law 360 IPWatchdog The Anatomy of a Bo Testing a Patent Claim Instruments and Auto Reforming Inequitabl Art Versus Function: C

Internet Archive Wayback Machine 27 captures 19 Sep 2013 - 13 Nov 2018

2014 2015 2016

8,562,770	7,535,547
D595,678	7,780,492
8,508,155	7,708,233
8,400,570	7,938,051
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8,310,824	11/049,621
8,497,972	13/310,690
8,351,014	13/275,624
8,441,574	61/556,150
8,418,387	61/557,287
8,369,083	CN Patent No. 100445844C
8,649,170	CA Patent Application No. 2,548,932
	CA Patent Application No. 2,716,459
	EP Application No. 04782955.1
	EP Application No. 111613380.8
	RU Patent No. 2358305
	TW Patent No. 100114268
	PCT/US/2004/028563
	PCT/US2011/031989
	GB9721804.4
	GB9814577.4
	PCT/GB98/02586
	7,002,660
	7,397,529
	DE Patent No. 698 29 495 T2
	CA Patent No. 2,306,636
	EP Patent No. 1023630 B1

Canada Patent Number

- 200880124923.0

Israel Patent Number

- 5351898

Republic of Korea Patent Number

- 2493575

Singapore Patent Number

- 161561


All MRI products are protected by MRI patents. MRI's USE of cut glass is protected by patents owned by Tannas Electronics Displays. This includes the 67" ThruVu cooler door and our 44" TTU (Taxi Top Unit).

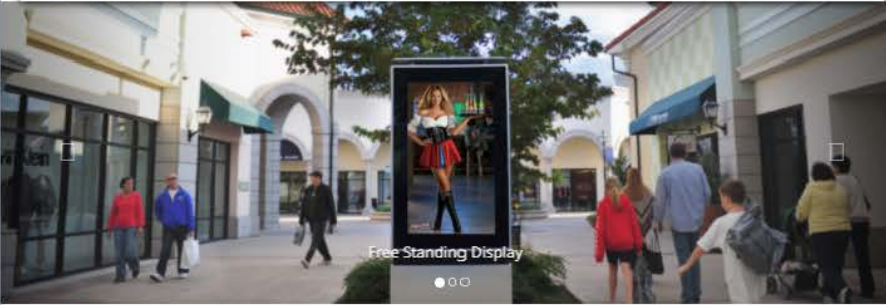
Recent News:

- On-vehicle digital signage is on the move
- MRI Announces On-the-Go Kiosk Deployment Throughout NYC Train Stations
- MRI Expands Global Presence
- Montreal gets on the bus with digital signage
- MORE NEWS RELEASES

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Free Standing Display

Patents

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- 8,274,622
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- 61/557,287
- CN Patent No. 100445844C

Wayback Machine

27 captures

19 Sep 2013 - 13 Nov 2018

SEP 30 OCT NOV 2015 2016 2017

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Canada Patent Number

- 200880124923.0

Israel Patent Number

- 5351898

Republic of Korea Patent Number

- 2493575

Singapore Patent Number

- 161561

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CN Patent No. 100445844C
CA Patent Application No. 2,548,932
CA Patent Application No. 2,716,459
EP Application No. 04782955.1
EP Application No. 111613380.8
RU Patent No. 2358305
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7,397,529
DE Patent No. 698 29 495 T2
CA Patent No. 2,306,636
EP Patent No. 1023630 B1

All MRI products are protected by MRI patents. MRI's USE of cut glass is protected by patents owned by Tannas Electronics Displays. This includes the 67" ThruVu cooler door and our 44" TTU (Taxi Top Unit).

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- MORE NEWS RELEASES

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EXHIBIT FFFF



6415 Shiloh Road E.
Alpharetta GA 30005
770-295-1201

120 V 60 HZ 15 A

Model: BC84PD-FAS0

Item:



K8400-000-ED-000-XX-4

Serial



NJ00318

SAM®, BestVu™, CoolVu®, AmpVu®, StatusVu®,
SureVu®, DynamicVu®, BrightVu®

Visit www.mri-inc.net/patents.asp for patent information



6415 Shiloh Road E
Alpharetta GA 30005
770 - 295 - 1201

120V AC 60HZ 16A

Model: BV84PS - FBT8

Part: K8400 - 000 - DB - 120 - AA



MFG Oct 2015

Serial: PJ00130



AmpVu[®] BoldVu[®] BrightVu[®] CoolVu[®] DynamicVu[®] EcoVu[™] SAM[®]
StatusVu[®] SureVu[®]

Visit www.lg-mri.com/patents for patent information

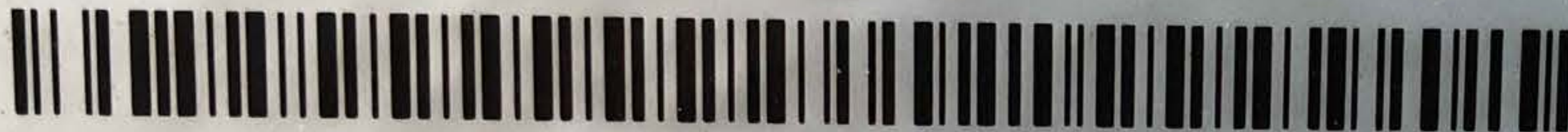


6415 Shiloh Road E
Alpharetta GA 30005
770 - 295 - 1201

120V AC 60HZ 6A

Model: DEMO

Part: K5500 - 000 - BK - 200 - LB



MFG Jun 2015

Serial: PE00198



AmpVu[®] BoldVu[®] BrightVu[®] CoolVu[®] DynamicVu[®] EcoVu[™] SAM[®]
StatusVu[®]

Visit www.lg-mri.com/patents for patent information



6415 Shiloh Road E
Alpharetta GA 30005
770-295-1201

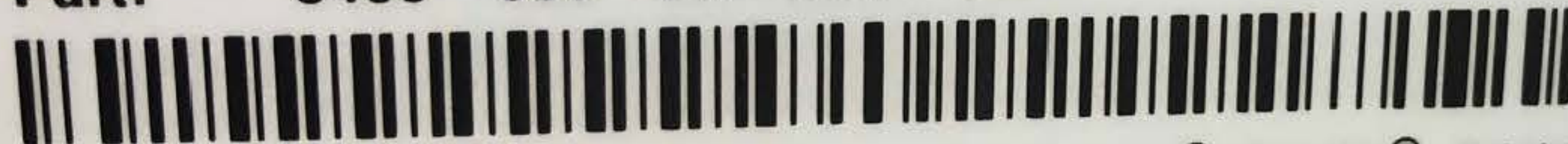
230V AC 50HZ
10A



Model: BV84PS - PAT0

Part: 8400 - 000 - BX - 030 - GB

MFG Mar 2016



Serial: QD00038



AmpVu® BoldVu® BrightVu® CoolVu®
DynamicVu® EcoVu™ SAM® StatusVu® SureVu®
Visit www.lg-mri.com/patents for patent information

EXHIBIT KKKK

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

MANUFACTURING RESOURCES)	
INTERNATIONAL, INC.,)	
)	
Plaintiff,)	
)	
v.)	C.A. No. 17-269-RGA
)	
CIVIQ SMARTSCAPES, LLC, CIVIQ)	
HOLDINGS, LLC, COMARK, LLC, and)	
COMARK HOLDINGS, LLC,)	
)	
Defendants.)	

**CIVIQ SMARTSCAPES, LLC; CIVIQ HOLDINGS, LLC; COMARK, LLC; AND
COMARK HOLDINGS, LLC’S FIRST SET OF REQUESTS FOR PRODUCTION OF
DOCUMENTS AND THINGS TO PLAINTIFF (NOS. 1-117)**

Pursuant to Rules 26 and 34 of the Federal Rules of Civil Procedure and the Local Rules of Civil Practice and Procedure of the United States District Court for the District of Delaware, Defendants Civiq Smartscapes, LLC; Civiq Holdings, LLC; Comark, LLC; and Comark Holdings, LLC (collectively, “Civiq”) request that Plaintiff Manufacturing Resources International, Inc. (“MRI”) respond to the following requests within thirty (30) days of service.

The documents and things shall be provided or produced for inspection and copying at the offices of Goodwin Procter, LLP, 100 Northern Avenue, Boston, MA 02210. If produced as originals, they shall be inspected and copied, continuing from day to day thereafter until completed. Additionally, Plaintiff shall serve written responses to these requests on Civiq’s counsel within thirty (30) days of the service hereof.

DEFINITIONS AND INSTRUCTIONS

1. Civiq incorporates by reference the Definitions and Instructions set forth in Defendants’ First Set of Interrogatories to Plaintiff Nos. 1-10.

2. The term “the ’595 patent” means U.S. Patent No. 8,854,595, titled “Constricted Convection Cooling System for an Electronic Display.”

3. The term “the ’322 patent” means U.S. Patent No. 9,173,322, titled “Constricted Convection Cooling System for an Electronic Display.”

4. The term “the ’165 patent” means U.S. Patent No. 8,767,165, titled “Isolated Gas Cooling System for an Electronic Display.”

5. The term “the ’622 patent” means U.S. Patent No. 8,274,622, titled “System for Using Constricted Convection with Closed Loop Plenum as the Convection Plate.”

6. The term “the ’695 patent” means U.S. Patent No. 8,482,695, titled “System for Using Constricted Convection with Closed Loop Cooling System as the Convection Plate.”

7. The term “the ’572 patent” means U.S. Patent No. 8,854,572, titled “System for Using Constricted Convection with Closed Loop Cooling System as the Convection Plate.”

8. The term “the ’079 patent” means U.S. Patent No. 9,089,079, titled “System for Using Constricted Convection with Closed Loop Cooling System as the Convection Plate.”

9. The term “the ’841 patent” means U.S. Patent No. 8,373,841, titled “Shared Isolated Gas Cooling System for Oppositely Facing Electronic Displays.”

10. The term “the ’014 patent” means U.S. Patent No. 8,351,014, titled “Heat Exchanger for Back to Back Electronic Displays.”

11. The term “the ’129 patent” means U.S. Patent No. 9,030,129, titled “Backlight Adjustment System.”

12. The term “the ’655 patent” means U.S. Patent No. 9,167,655, titled “Backlight Adjustment System.”

13. The term “the ’163 patent” means U.S. Patent No. 8,125,163, titled “Backlight Adjustment System.”

14. The term “the ’815 patent” means U.S. Patent No. 8,829,815, titled “Backlight Adjustment System.”

15. The term “the ’917 patent” means U.S. Patent No. 9,313,917, titled “Thermal Plate with Optional Cooling Loop in Electronic Display.”

16. The term “the ’972 patent” means U.S. Patent No. 8,497,972, titled “Thermal Plate with Optional Cooling Loop in Electronic Display.”

17. The term “the ’452 patent” means U.S. Patent No. 8,016,452, titled “Advertising Displays.”

18. The term “the ’569 patent” means U.S. Patent No. 9,448,569, titled “System for Reducing the Thermal Inertia of an Electronic Display.”

19. The term “Patents-in-Suit” refers collectively to the ’595 patent, the ’322 patent, the ’165 patent, the ’622 patent, the ’695 patent, the ’572 patent, the ’079 patent, the ’841 patent, the ’014 patent, the ’129 patent, the ’655 patent, the ’163 patent, the ’815 patent, the ’917 patent, the ’972 patent, the ’452 patent, and the ’569 patent.

20. The term “Asserted Claim” means all of the claims in all of the Patents-in-Suit until such time as MRI formally identifies to Civiq a smaller set of these claims that are the subject of MRI’s allegations in this matter that Civiq infringes the Patents-in-Suit.

21. The term “related application” means any and all applications related to the Patents-in-Suit, any parent, divisional, continuation, or continuation-in-part, provisional and/or PCT, as well as any interferences, *inter partes* reviews, post grant reviews, reissues or

reexaminations of those patents, and any foreign counterparts to those patents and/or applications, whether abandoned and whether or not issued.

22. The term “Plaintiff,” “MRI,” “you,” or “your” means, individually and/or collectively, Manufacturing Resources International, Inc.; LG-MRI, Inc.; their parents, predecessors, divisions, subsidiaries, affiliates, partnerships, and joint ventures, either collectively, individually, or in any subset; as well as their directors, officers, employees, agents, distributors, salespersons, sales representatives, and attorneys, and each person acting or purporting to act on their behalf or under their control.

23. The terms “Civiq” or “Defendants” mean, individually and/or collectively, Civiq Smartscapes, LLC; Civiq Holdings, LLC; Comark, LLC; and Comark Holdings, LLC.

24. The term “Vertigo Group” means Vertigo Group Canada, vertiGo Group Inc., and/or Vertigo Digital Designs LLC, individually and/or collectively; their parents, predecessors, divisions, subsidiaries, affiliates, partnerships, and joint ventures thereof, either collectively, individually, or in any subset; as well as any directors, officers, employees, agents, distributors, salespersons, sales representatives, and attorneys thereof; and each person acting or purporting to act on their behalf or under their control.

25. The term “JMC Capital Partners entities” means any entity in which JMC Capital Partners II, L.P.; JMC Capital Partners II, Limited Partnership; JMC Capital Partners LLC; JMC Capital Partners, L.P.; JMC Capital Partners, Limited Partnership; JMC Management, LLC; or any parent, predecessor, subsidiary, or affiliate thereof has any ownership or equity interest.

26. The term “this matter” refers to the lawsuit captioned *Manufacturing Resources International, Inc. v. Civiq Smartscapes, LLC et al.*, No. 1:17-cv-00269-RGA, currently pending in the United States Federal District Court for the District of Delaware.

27. The term “MRI’s Complaint” means the Complaint filed in this matter on March 14, 2017, docket number 1.

28. The term “Civiq’s First Amended Answer and Counterclaims” means Defendants’ First Amended Answer and Counterclaims filed in this matter on August 28, 2017, docket number 20.

29. The term “Samsung OH-D display” means Samsung’s OH-D line of display products referenced at, for example, Paragraph 37 of MRI’s Complaint in this matter.

30. The term “Named Inventors” means the individuals listed as inventors on the face of the Patents-in-Suit.

31. The term “Figure 9” means the image labeled “FIG-9” that appears at sheet 10 of 10 of the ’595 patent and at sheet 10 of 10 of the ’322 patent.

32. The term “Accused Civiq Product” means any product MRI alleges is made, used, sold, or offered for sale by Civiq that MRI alleges infringes any of the Patents-in-Suit.

33. The term “patented MRI product” means any MRI product currently or previously used, made, sold, or offered for sale by MRI or any affiliate of MRI that MRI alleges embodies any of the Patents-in-Suit.

34. The term “the ’174 patent” means U.S. Patent No. 8,472,174, titled, “Video display system.”

35. The term “the ’060 patent” means U.S. Patent No. 9,451,060, titled “Techniques and apparatus for controlling access to components of a personal communications structure (PCS).”

36. The term “USPTO” means the United States Patent and Trademark Office, including employees thereof.

37. The term “prior art” refers to the subject matter described in every subdivision of 35 U.S.C. §§ 102 and 103, regardless of whether such subject matter was disclosed to the USPTO or cited by the USPTO.

38. The term “concerning” means relating to, referring to, describing, evidencing, supporting, documenting, involving, constituting, or comprising.

39. The term “person” means any natural person or any business, governmental entity, or association, including, but not limited to, any individual, company, corporation, division, joint venture, partnership, unincorporated association, or other entity.

40. The term “participate in” means to have involvement of any kind in, including, but not limited to: conducting, sponsoring, funding, planning, providing input into, supplying, assisting, or performing.

41. The term “communication” means transmittal of information (in the form of facts, ideas, inquiries or otherwise) by oral, written, telephonic, electronic or radio frequency transmission, or by any other means.

42. The term “including” means “including without limitation.”

43. The term “date” shall mean and refer to the exact month, day and year, to the extent known, or, if not known, MRI’s best approximation thereof.

44. The terms “all,” “any,” and “each” shall be construed as encompassing any and all.

45. The terms “and” and “or” shall both be read in the conjunctive and in the disjunctive wherever they appear, and neither of these words shall be interpreted to limit the scope of an interrogatory. The use of a verb in any tense shall be construed as the use of the verb in all other tenses, and the singular form shall be deemed to include the plural and vice-versa.

The use of any term in the masculine shall include the use of the term in the feminine and vice-versa.

46. The term “identify” means:

- (a) In the context of a natural person, to provide the person’s (i) full name; (ii) present or last known residential address and telephone number; (iii) present or last known business address and telephone number; and (iv) present or last known place of employment and job description. If the natural person was employed at or by MRI, “identify” also means to provide (v) the title(s) of the person at MRI and person’s dates of employment at MRI.
- (b) In the case of a business, legal or governmental entity or association, to provide the entity or association’s (i) full name; (ii) legal form (*e.g.*, corporation, partnership, etc.) and state of incorporation or legal formation; (iii) address and principal place of business; (iv) officers and other persons having knowledge of the matter with respect to which the entity or association is named; and (v) the basis for its inclusion in your response.
- (c) In the case of a document, to provide: (i) the identity of the person(s) originating and preparing it; (ii) the sender, if not the person who originated it; (iii) its general type (*e.g.*, letter, memorandum, etc.), title, and identifying number; (iv) the general nature of its subject matter; (v) its date of preparation; (vi) the date and manner of any transmission, distribution, or publication; (vii) the location of each copy (including title, index number and location of the file which it is kept or from which it was removed) and the identity of the person or custodian or persons responsible for its filing or other disposition; and (viii) the identity of persons who

can authenticate or identify it.

- (d) In the case of a thing to provide: (i) any model or catalog number; (ii) any article of model name; (iii) any technical or promotional materials describing the article or its use; (iv) the dates and locations of its production.

47. The term “document” shall mean writings, recordings and other communications reduced to physical or electronic form to the full extent contemplated by the Federal Rules of Civil Procedure, including the originals and all non-identical copies, whether different from the original by reason of any notation made on such copies or otherwise (including without limitation, correspondence, memoranda, notes, e-mail, diaries, minutes, statistics, letters, telegrams, contracts, reports, studies, checks, statements, tags, labels, invoices, brochures, periodicals, receipts, returns, summaries, pamphlets, books, prospectuses, calendars, diaries, planners, interoffice and intra-office communications, offers, notations of any sort of conversations, working papers, applications, permits, surveys, indices, telephone calls, meetings, or printouts, teletypes, telefax, invoices, work sheets, and all drafts, alterations, modifications, changes and amendments of the foregoing), graphic or oral representations of any kind (including without limitation, photographs, charts, microfiche, microfilm, videotape, recordings, motion pictures, plans, drawings, surveys), and electronic, mechanical or electric records or representations of any kind (including without limitation, tapes, cassettes, discs, and recordings).

48. The terms “and” and “or” shall be construed disjunctively or conjunctively as necessary to bring within the scope of the request all responses which otherwise might be construed to be outside its scope.

49. Any word written in the singular herein shall be construed as plural or vice versa to bring within the scope of the request all responses which might be construed to be outside its scope.

50. These requests shall be deemed to be continuing, such that if MRI becomes aware of additional responsive information or business records after the date of answer specified above, MRI should promptly furnish such information or business records to Civiq's counsel.

51. In responding to these requests, MRI is required to furnish all information that is available to MRI or subject to MRI's reasonable inquiry, including information in the possession of MRI's officers, directors, employees, attorneys, accountants, advisors, agents, or other persons directly or indirectly employed by, or connected with, MRI or MRI's attorneys, and any person otherwise subject to MRI's control.

52. If MRI objects to all or any part of a request, state the grounds of the objection with sufficient specificity to permit determination of the basis for, and propriety of, such objection, including citations where legal authority is relied upon, and answer to the extent the request is not objectionable. All objections shall be signed by the attorney making them.

53. If any information called for by the discovery request is unknown to MRI, please respond to the discovery request to the full extent of MRI's knowledge, and state the reasons why the remainder of the request cannot be answered. If any answers are qualified, set forth the details of such qualifications.

54. If MRI is unable to understand any of the following requests, any of the applicable Definition or Instructions, Civiq requests that MRI immediately seek clarification through Civiq's counsel.

55. To the extent that MRI believes any part of a request to be ambiguous, set forth the manner in which it is deemed ambiguous and the construction chosen or used in responding to the request.

DOCUMENTS AND THINGS REQUESTED

REQUEST NO. 1.

Each and every document, thing, ESI, or tangible item requested by any one or more request in Civiq's First Set of Interrogatories to MRI or consulted by MRI in preparing their response to Civiq's First Set of Interrogatories.

REQUEST NO. 2.

Each and every document, thing, ESI, or tangible item concerning the conception of each of the inventions described or claimed in the Patents-in-Suit, including, without limitation, the first disclosure by any of the alleged inventors to another person, the first notes regarding the invention, and the first written description of these inventions.

REQUEST NO. 3.

Each and every document, thing, ESI, or tangible item concerning the reduction to practice of each of the inventions described or claimed in the Patents-in-Suit, including all notebooks, memoranda, models, CAD files or other product schematics or representations, prototypes, and test results.

REQUEST NO. 4.

Each and every document, thing, ESI, or tangible item concerning the first public disclosure of use or each of the inventions described or claimed in the Patents-in-Suit.

REQUEST NO. 5.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the person(s) who conceived and reduced to practice the alleged invention(s) claimed in the MRI patents.

REQUEST NO. 6.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the earliest date the alleged invention(s) claimed in the MRI patents was conceived and/or actually reduced to practice.

REQUEST NO. 7.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the nature of each person(s)'s contribution to the alleged invention(s) claimed in the Patents-in-Suit.

REQUEST NO. 8.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the circumstances under which the subject matter of each claim of the Patents-in-Suit was conceived and reduced to practice.

REQUEST NO. 9.

Each and every document, thing, ESI, or tangible item concerning the testing, development, or design of any of the inventions described or claimed in the Patents-in-Suit.

REQUEST NO. 10.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes all patent licenses, offers to license, or attempts to negotiate a license to the Patents-in-Suit.

REQUEST NO. 11.

Provide each and every document, thing, ESI, or tangible item that relates or refers to or describes the procedures or techniques that MRI used for the temperature regulation of digital screens or displays.

REQUEST NO. 12.

Provide each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's knowledge about techniques for temperature regulation of digital screens or displays.

REQUEST NO. 13.

Provide each and every document, thing, ESI, or tangible item that relates or refers to or describes Ralph Idems, Chris Bolton, Dwayne Gavel or the work of Ralph Idems, Chris Bolton, or Dwayne Gavel.

REQUEST NO. 14.

Provide each and every communication between MRI or any representative thereof, including William Dunn, and Ralph Idems, Chris Bolton, or Dwayne Gavel.

REQUEST NO. 15.

Provide each and every document, thing, ESI, or tangible item that relates or refers to or describes the relationship between MRI and Vertigo Group, including any nondisclosure or other agreements.

REQUEST NO. 16.

Provide each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's knowledge about the investigation and/or development of the use of techniques for regulating temperature in digital screens or displays by Vertigo Group.

REQUEST NO. 17.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's collaboration with Vertigo Group.

REQUEST NO. 18.

Each and every document, thing, ESI, or tangible item concerning the 2008 Digital Signage Expo in Las Vegas, NV, including any involvement or participation in the 2008 Digital Signage Expo by MRI, Vertigo Group, or any representatives or affiliates thereof.

REQUEST NO. 19.

Each and every document, thing, ESI, or tangible item concerning the InfoComm 2008 trade show in Las Vegas, NV, including any involvement or participation in InfoComm 2008 by MRI, Vertigo Group, or any representatives or affiliates thereof.

REQUEST NO. 20.

Provide each and every document, thing, ESI, or tangible item that relates or refers to, or reports or describes any public comment, publication, advertisement, or promotion by MRI on the use of techniques for regulating temperature in digital screens or displays.

REQUEST NO. 21.

Each and every document, thing, ESI, or tangible item concerning, supporting or refuting any contention that the inventions disclosed or claimed in the Patents-in-Suit are nonobvious, including, but not limited to, documents concerning the commercial success, licensing, long-felt need, copying, initial professional skepticism or praise, or any other secondary indicia of nonobviousness of the inventions claimed or disclosed in the Patents-in-Suit.

REQUEST NO. 22.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes commercial embodiments of the claimed subject matter of the Patents-in-Suit.

REQUEST NO. 23.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes each item of prior art known to MRI that is relevant or material to the patentability of the Patents-in-Suit.

REQUEST NO. 24.

Each and every document, thing, ESI, or tangible item relating to any search for or analysis of any prior art relating to the subject matter of the Patents-in-Suit or any patent application that matured, directly or indirectly, into the Patents-in-Suit.

REQUEST NO. 25.

Each and every document, thing, ESI, or tangible item relating to, identifying, memorializing, constituting, disclosing, describing, or discussing the enforceability of the Patents-in-Suit.

REQUEST NO. 26.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the alleged date and location of the first use in the United States and/or foreign country by a person other than the Named Inventors of the Patents-in-Suit.

REQUEST NO. 27.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the first advertisement in the United States and/or foreign country of subject matter claimed in the Patents-in-Suit.

REQUEST NO. 28.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the first sale in the United States and/or foreign country of subject matter claimed in the Patents-in-Suit.

REQUEST NO. 29.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes the first offer for sale in the United States and/or foreign country of subject matter claimed in the Patents-in-Suit.

REQUEST NO. 30.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's first use and/or purchase of "closed loop" and/or "open loop" thermal regulation technology.

REQUEST NO. 31.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's first use and/or purchase of thermal plate or convection plate thermal regulation technology.

REQUEST NO. 32.

Each and every document, thing, ESI, or tangible item that relates or refers to or describes MRI's first use of thermally-conductive housing thermal regulation technology.

REQUEST NO. 33.

Each and every document, thing, ESI, or tangible item concerning the decision to file the Patent-in-Suit applications and/or any foreign counterparts.

REQUEST NO. 34.

Each and every document, thing, ESI, or tangible item concerning any prototype, test, or experimental data which supports, contradicts, or is inconsistent with the teachings and representations contained in the Patents-in-Suit.

REQUEST NO. 35.

Each and every document, thing, ESI, or tangible item concerning any search, investigation, review, opinion, study, event or reference relating to the patentability, scope, validity, infringement or enforceability of any claim of any of the Patents-in-Suit.

REQUEST NO. 36.

Each and every document, thing, ESI, or tangible item concerning the level of ordinary skill in the art pertaining to the subject matter of the Patents-in-Suit.

REQUEST NO. 37.

Provide each and every document, thing, ESI, or tangible item that is sufficient to describe sales of commercial embodiments covered by the Patents-in-Suit.

REQUEST NO. 38.

Each and every document, thing, ESI, or tangible item relating to the preparation, decision to file, filing, and prosecution of the Patents-in-Suit, including:

- (a) the complete prosecution history;
- (b) all documents referred to or relied upon in preparing the application;
- (c) all documents that refer or related to communications between MRI and any patent attorney or agent concerning the application;
- (d) all drafts of the application of or any papers filed during prosecution;
- (e) all drawings prepared in connection with the application; and
- (f) all documents concerning ownership of the application.

REQUEST NO. 39.

Each and every document, thing, ESI, or tangible item concerning any foreign patent application of filing that describes in whole or in part the subject matter described in the Patents-in-Suit, or that claims that benefit of the filing date of the Patents-in-Suit, including but not limited to, the application, its prosecution history, and any resulting patent.

REQUEST NO. 40.

Each and every document, thing, ESI, or tangible item including patents, publications, technical papers, texts of speeches, or promotional literature, that refer or related to any of the inventions described or claimed in the Patents-in-Suit.

REQUEST NO. 41.

Each and every document, thing, ESI, or tangible item that refer or relate to communications between MRI and any person concerning the Patents-in-Suit.

REQUEST NO. 42.

All studies, reports, opinions, or other documents made by or on behalf of MRI that refer or relate to whether any product, method, or technology designed, developed, tested, made, used, demonstrated, deployed, performed, rendered, offered for sale or sold by Civiq infringes any of the Patents-in-Suit, including, but not limited to, all patents and other references or things identified, considered, or analyzed in such studies, reports, opinions, or documents.

REQUEST NO. 43.

Each and every document, thing, ESI, or tangible item relating or referring to any Civiq product MRI accuses of infringing the Patents-in-Suit.

REQUEST NO. 44.

Each and every document, thing, ESI, or tangible item relating to each product or device designed, manufactured, demonstrated, offered for sale, or sold by MRI, (or by any entity or person with which MRI has been affiliated), that is within the scope of any claim of the Patents-in-Suit.

REQUEST NO. 45.

Each and every document, thing, ESI, or tangible item evidencing, concerning, or relating to business competition between MRI and Civiq.

REQUEST NO. 46.

Each and every document, thing, ESI, or tangible item that refer or relate to publications, advertising or promotional literature for each device or product that MRI (or any entity or person with which MRI has be affiliated) developed, manufactured, offered for sale, or sold and that is within the scope of any of the claims of the Patents-in-Suit, including but not limited to, copies of advertisements or promotional literature, documents sufficient to identify the magazines and trade journals in which such advertisements or promotional literature appeared, press releases, product announcements, solicitations, articles, speech or lecture texts, sales presentations, product brochures, and catalogues, whether or not actually used.

REQUEST NO. 47.

Each and every document, thing, ESI, or tangible item concerning any damage MRI contends it has suffered as a result of the alleged infringement by Civiq of any claim of the Patents-in-Suit.

REQUEST NO. 48.

Each and every document, thing, ESI, or tangible item concerning or relating to any profits that MRI has lost due to Civiq's alleged infringement.

REQUEST NO. 49.

Each and every document, thing, ESI, or tangible item concerning reasonable and/or established royalty payments, theoretical or actual, relating to the Patents-in-Suit.

REQUEST NO. 50.

Each and every document, thing, ESI, or tangible item concerning MRI's customers and/or sales that MRI allegedly lost to Civiq directly or indirectly due to Civiq's alleged infringement.

REQUEST NO. 51.

Each and every document, thing, ESI, or tangible item concerning sales and training materials for any patented MRI product.

REQUEST NO. 52.

Each and every document, thing, ESI, or tangible item concerning any selling points or techniques proposed or used for any MRI product.

REQUEST NO. 53.

Each and every document, thing, ESI, or tangible item concerning all licenses granted to MRI of any right, title, privilege, or interest concerning any patent, including but not limited to exhibits, amendments, attachments, schedules, or appendices thereto.

REQUEST NO. 54.

Each and every document, thing, ESI, or tangible item concerning the volume of each patented MRI product made and sold.

REQUEST NO. 55.

Each and every document, thing, ESI, or tangible item concerning, for each patented MRI product, all documents and/or data sufficient to completely reconstruct all purchase orders and invoices concerning any such product, including the final amounts of such purchase orders and invoices, together with documents sufficient to explain in detail the structure and format of such data.

REQUEST NO. 56.

Each and every document, thing, ESI, or tangible item concerning all summaries and reports concerning purchase orders and invoices for each patented MRI product.

REQUEST NO. 57.

Each and every document, thing, ESI, or tangible item concerning the gross profit, net income, net profit/net income before taxes on each such product, or the marginal profit for each patented MRI product.

REQUEST NO. 58.

Each and every document, thing, ESI, or tangible item concerning the gross revenues or net revenues on sales on each patented MRI product.

REQUEST NO. 59.

For each patented MRI product, each and every document, thing, ESI, or tangible item concerning the cost of goods, cost of sales, cost of development, fixed costs, or variable costs on each such product.

REQUEST NO. 60.

For each patented MRI product, each and every document, thing, ESI, or tangible item concerning the cost of developing the capacity to make, sell, or import each such product.

REQUEST NO. 61.

For each patented MRI product, each and every document, thing, ESI, or tangible item sufficient to show MRI's average selling price for such product, including but not limited to all documents concerning how such average selling price is calculated.

REQUEST NO. 62.

For each patented MRI product, each and every document, thing, ESI, or tangible item concerning pricing of such product including any pricing policy applicable to such product.

REQUEST NO. 63.

For each patented MRI product, each and every document, thing, ESI, or tangible item concerning market share.

REQUEST NO. 64.

Each and every document, thing, ESI, or tangible item concerning any product, other than MRI products or Accused CRL Product(s), that is perceived by MRI or that has been identified to

MRI, as competitive with or substitutable for such MRI patented product or Accused Civiq Product.

REQUEST NO. 65.

Each and every document, thing, ESI, or tangible item concerning any product, other than MRI Products or Accused Civiq Products, that MRI believes incorporates, performs, or embodies the subject matter of any of the alleged inventions described or claimed in the Patents-in-Suit.

REQUEST NO. 66.

Each and every document, thing, ESI, or tangible item concerning the actual, projected, or desired return on investment for the manufacture or sale of any patented MRI product.

REQUEST NO. 67.

Each and every document, thing, ESI, or tangible item concerning MRI's projections or expectations at any time regarding future sales or actual or anticipated profitability of any patented MRI product in the United States.

REQUEST NO. 68.

Each and every document, thing, ESI, or tangible item concerning any marketing strategy, sales strategy, marketing plan, strategic plan, business plan, or promotional effort with respect to any patented MRI product.

REQUEST NO. 69.

All marketing forecasts, sales forecasts, or marketing studies concerning any patented MRI product.

REQUEST NO. 70.

Each and every document, thing, ESI, or tangible item sufficient to describe whether all patented MRI products are marked with patent numbers and if so, what patent numbers are so marked on these products.

REQUEST NO. 71.

Each and every document, thing, ESI, or tangible item, such as accounting and controller procedure manuals, sufficient to explain the design, operation, and use of MRI's sales, accounting and/or financial systems.

REQUEST NO. 72.

Each and every document, thing, ESI, or tangible item sufficient to explain the design, operation, and use of MRI's document and information management systems.

REQUEST NO. 73.

For each patented MRI product, each and every document, thing, ESI, or tangible item documents concerning agreements between MRI and all reseller(s), distributor(s) and/or customer(s).

REQUEST NO. 74.

Each and every document, thing, ESI, or tangible item concerning the construction, interpretation, or meaning of the claim terms of each of the Patents-in-Suit.

REQUEST NO. 75.

Each and every document, thing, ESI, or tangible item passing between MRI and any person that MRI intends to call as a witness (including without limitation any expert witness) at any trial or hearing in this action.

REQUEST NO. 76.

Each and every document, thing, ESI, or tangible item on which MRI intends to rely in support of its claims in this matter.

REQUEST NO. 77.

Each and every document, thing, ESI, or tangible item concerning audited and un-audited income statements, balance sheets and statements of cash flow on a monthly, quarterly and annual basis that concern the Patents-in-Suit and/or each patented MRI product.

REQUEST NO. 78.

Each and every document, thing, ESI, or tangible item concerning the valuation of the Patents-in-Suit.

REQUEST NO. 79.

Each and every document, thing, ESI, or tangible item which describes or demonstrates how the Patents-in-Suit are incorporated or utilized by any or all MRI products, both current and former.

REQUEST NO. 80.

Each and every document, thing, ESI, or tangible item relating to Figure 1 of Civiq's First Amended Answer and Counterclaims.

REQUEST NO. 81.

Each and every document, thing, ESI, or tangible item concerning Figure 9 of the '595 and '322 patents, including any drafts or versions thereof.

REQUEST NO. 82.

Each and every document, thing, ESI, or tangible item concerning Exhibit C to MRI's Complaint.

REQUEST NO. 83.

Each and every document, thing, ESI, or tangible item concerning MRI's allegation that LG Electronics, Inc. monitors (including LG monitors allegedly used in outdoor digital display products) infringe or infringed of any of the Patents-in-Suit or any patent issuing from any related application to the Patents-in-Suit.

REQUEST NO. 84.

Each and every communication between MRI or its representatives and LG Electronics, Inc. or its representatives regarding alleged infringement of any of the Patents-in-Suit or any patent issuing from any related application to the Patents-in-Suit by LG monitors (including LG monitors allegedly used in outdoor digital display products).

REQUEST NO. 85.

Each and every document, thing, ESI, or tangible item concerning MRI's allegation that Samsung OH-D monitors (including Samsung OH-D monitors allegedly used in outdoor digital display products) infringe or infringed of any of the Patents-in-Suit or any patent issuing from any related application to the Patents-in-Suit.

REQUEST NO. 86.

Each and every communication between MRI or its representatives and Samsung or its representatives regarding alleged infringement of any of the Patents-in-Suit or any patent issuing from any related application to the Patents-in-Suit by Samsung OH-D monitors (including Samsung OH-D monitors allegedly used in outdoor digital display products).

REQUEST NO. 87.

Each and every document, thing, ESI, or tangible item concerning communications between the Named Inventor(s) and Vertigo Group or any individual affiliated with Vertigo Group.

REQUEST NO. 88.

Each and every document, thing, ESI, or tangible item relating to communications between MRI and Vertigo Group or any individual affiliated with Vertigo Group.

REQUEST NO. 89.

Each and every document, thing, ESI, or tangible item relating to communications between MRI and Civiq.

REQUEST NO. 90.

Each and every document, thing, ESI, or tangible item relating to the Las Vegas installation referenced in Paragraph 18 of MRI's complaint.

REQUEST NO. 91.

Each and every document, thing, ESI, or tangible item relating to MRI's decision to target JMC Capital Partners entities as defendants in this matter.

REQUEST NO. 92.

Each and every document, thing, ESI, or tangible item relied upon by MRI in the preparation of its Complaint

REQUEST NO. 93.

Each and every document, thing, ESI, or tangible item relating to the '174 patent.

REQUEST NO. 94.

Each and every document, thing, ESI, or tangible item relating to the '060 patent.

REQUEST NO. 95.

Each and every document, thing, ESI, or tangible item relating to Civiq Smartscares, LLC.

REQUEST NO. 96.

Each and every document, thing, ESI, or tangible item relating to Civiq Holdings, LLC.

REQUEST NO. 97.

Each and every document, thing, ESI, or tangible item relating to Comark, LLC.

REQUEST NO. 98.

Each and every document, thing, ESI, or tangible item relating to Comark Holdings, LLC.

REQUEST NO. 99.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on direct infringement of the Patents-in-Suit.

REQUEST NO. 100.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on indirect infringement of the Patents-in-Suit.

REQUEST NO. 101.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on federal trademark infringement.

REQUEST NO. 102.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on Delaware common law trademark infringement.

REQUEST NO. 103.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on the Lanham Act.

REQUEST NO. 104.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on deceptive trade practices under Delaware statutory law.

REQUEST NO. 105.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on deceptive trade practices under Delaware common law.

REQUEST NO. 106.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on unfair competition under Delaware common law.

REQUEST NO. 107.

Each and every document, thing, ESI, or tangible item relating to MRI's claims for relief in this matter based on injury to business reputation under Delaware common law.

REQUEST NO. 108.

Each and every document, thing, ESI, or tangible item relating to the Link product that MRI accuses of infringing the Patents-in-Suit.

REQUEST NO. 109.

Each and every document, thing, ESI, or tangible item relating to the Totem product that MRI accuses of infringing the Patents-in-Suit.

REQUEST NO. 110.

Each and every document, thing, ESI, or tangible item relating to the Ferro product that MRI accuses of infringing the Patents-in-Suit.

REQUEST NO. 111.

Each and every document, thing, ESI, or tangible item relating to the Pronto product that MRI accuses of infringing the Patents-in-Suit.

REQUEST NO. 112.

Each and every document, thing, ESI, or tangible item relating to the "FlexVue line of displays" referred to in Paragraph 151 of MRI's Complaint.

REQUEST NO. 113.

Each and every document, thing, ESI, or tangible item relating to the "Digital Out of Home Displays" referred to in Paragraph 151 of MRI's Complaint.

REQUEST NO. 114.

Each and every document, thing, ESI, or tangible item relating to the "digital menu boards" referred to in Paragraph 151 of MRI's Complaint.

REQUEST NO. 115.

Each and every document, thing, ESI, or tangible item relating to the "presell boards" referred to in Paragraph 151 of MRI's Complaint.

REQUEST NO. 116.

Each and every document, thing, ESI, or tangible item relating to the “beverage center boards” referred to in Paragraph 151 of MRI’s Complaint.

REQUEST NO. 117.

Each and every document, thing, ESI, or tangible item relating to the “outdoor billboards” referred to in Paragraph 151 of MRI’s Complaint.

Respectfully submitted,

Dated: September 15, 2017

/s/ Molly R. Grammel

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CERTIFICATE OF SERVICE

I hereby certify that on September 15, 2017, copies of the foregoing were caused to be served upon the following in the manner indicated:

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